

Jesse Terrell, Commissioner
Larry Granados, Commissioner
Donald J. Glacy, Commissioner



Kristie Womack, Chairman

Jason Kasal, Vice Chairman
Victor Molaschi, Commissioner
Mark McCullough, Commissioner

**ROANOKE PLANNING AND ZONING AGENDA
MARCH 6, 2023
7:00 PM**

**500 S. OAK STREET
ROANOKE, TX 76262**

A. CALL TO ORDER

B. PUBLIC INPUT

This item is available for citizens to address the Planning and Zoning Commission on any issues that are not the subject of a public hearing. No action by law may be taken on the topic. The presiding officer reserves the right to impose a time limit on this portion of the agenda. In order to provide the highest quality audio, all speakers need to speak at the podium.

C. APPROVAL OF THE MINUTES

1. Consideration and action on approval of the minutes from the Special Planning and Zoning Commission meeting held on January 9, 2023.

D. NEW BUSINESS

1. Public hearing to consider amending the Comprehensive Zoning Ordinance of the City of Roanoke, Texas, for Lot 8r, Block 1 of the Bobcat Corners Addition, an addition to the City of Roanoke, Denton County, Texas, by changing the zoning on said tract of land from Light Commercial District (LC) to Light Commercial District – Specific Use Permit (LC-SUP) to allow a research lab (non-hazardous) use. Property is generally located at 1741 N. Hwy 377, Suite 116. (SUP-2023-01 / Ordinance No. 2023-104)
2. Consideration and recommendation on a Specific Use Permit (SUP 2023-01) request from Sebastian Sobczak, amending the Comprehensive Zoning Ordinance of the City of Roanoke, Texas, for Lot 8R, Block 1 of



AGENDA FOR THE PLANNING AND ZONING COMMISSION

March 6, 2023
Page 2 of 2

the Bobcat Corners Addition, an addition to the City of Roanoke, Denton County, Texas, by changing the zoning on said tract of land from Light Commercial District (LC) to Light Commercial District – Specific Use Permit (LC-SUP) to allow a research lab (non-hazardous) use. The property is generally located on the West side of US Hwy 377 behind 7-Eleven, and has an address of 1741 N. Hwy 377, Suite 116. (SUP-2023-01 / Ordinance No. 2023-104)

The Planning and Zoning Commission reserves the right to adjourn into Executive Session during the course of this meeting to discuss any item on the posted agenda as authorized by Chapter 551 of the Texas Government Code.

E. ADJOURNMENT

CERTIFICATION

I certify that the above notice was posted at City Hall, 500 South Oak Street, Roanoke, Texas, on Wednesday, March 1, 2023, by 5:00 pm, in accordance with Chapter 551, Texas Government Code.

April S. Hill, City Secretary

*Any person planning to attend this meeting that may require auxiliary aids or services should request accommodations two (2) days prior to the meeting by calling (817) 491-8152. **BRILLE IS NOT AVAILABLE.**

A public wireless network is now available in the Council Chambers for use during meetings. It is available from 7am to 11pm Monday thru Friday. The name of the network is: City Hall Guests



AGENDA ITEM

TO: Planning and Zoning Commission

SUBJECT: 01/09/2023 - P&Z Minutes - Special Meeting

MEETING DATE: March 6, 2023

DEPARTMENT: City Secretary

ITEM SUMMARY:

Consideration and action on approval of the minutes from the Special Planning and Zoning Commission meeting held on January 9, 2023.

INFORMATION:

STAFF RECOMMENDATION:

SPECIAL CONSIDERATION:

FINANCIAL CONSIDERATION:

ATTACHMENTS:

1. PZMin 01-09-2023 - Special Meeting

Jesse Terrell, Commissioner
Larry Granados, Commissioner
Donald J. Glacy, Commissioner



Jason Kasal, Vice Chairman
Victor Molaschi, Commissioner
Mark McCullough, Commissioner

ROANOKE PLANNING AND ZONING MINUTES
JANUARY 9, 2023
7:00 P.M.
ROANOKE CITY HALL
500 S. OAK STREET
ROANOKE, TEXAS 76262

Present: Vice Chairman Jason Kasal; Commissioners: Mark McCullough, Victor Molaschi, Jesse Terrell, Larry Granados, and Donald J. Glacy, City Planner Kelly Carlson, and P&Z Secretary Sherry Gragg.

Absent: Chairman Kristie Womack.

A. CALL TO ORDER

Meeting called to order at 7:00 p.m.

B. PUBLIC INPUT

No one wished to speak.

C. APPROVAL OF THE MINUTES

1. Motion made by Donald J. Glacy second by Mark McCullough to approve the minutes from the regular Planning and Zoning Commission meeting held on December 5, 2022.

Motion carried 5-0-1. Commissioner Jesse Terrell abstained, as he was not present at this meeting.

D. NEW BUSINESS

1. Motion made by Donald J. Glacy second by Victor Molaschi to approve a site plan (SP 2023-01) request from Randy Primrose for live work use with upper floor residential units on lots 7R and 15R, Block 12 of the Original Town of Roanoke Addition, an addition to the City of Roanoke, Denton County, Texas. The property is generally located on the east side of N Hwy 377 between Main and Rusk Street.

Motion carried unanimously.



**MINUTES FOR THE REGULAR
PLANNING AND ZONING COMMISSION
MEETING**

**January 9, 2023
Page 2 of 2**

E. ADJOURNMENT

Motion made by Donald J. Glacy second by Victor Molaschi to adjourn the meeting at 7:04 p.m.

Motion carried unanimously.

Jason Kasal, Vice Chairman

Sherry Gragg, P&Z Secretary



AGENDA ITEM

TO: Planning and Zoning Commission

SUBJECT: PH Notice - SUP 2023-01 Research Lab

MEETING DATE: March 6, 2023

DEPARTMENT: City Secretary

ITEM SUMMARY:

Public hearing to consider amending the Comprehensive Zoning Ordinance of the City of Roanoke, Texas, for Lot 8r, Block 1 of the Bobcat Corners Addition, an addition to the City of Roanoke, Denton County, Texas, by changing the zoning on said tract of land from Light Commercial District (LC) to Light Commercial District – Specific Use Permit (LC-SUP) to allow a research lab (non-hazardous) use. Property is generally located at 1741 N. Hwy 377, Suite 116. (SUP-2023-01 / Ordinance No. 2023-104)

INFORMATION:

STAFF RECOMMENDATION:

SPECIAL CONSIDERATION:

FINANCIAL CONSIDERATION:

ATTACHMENTS:

1. PH Notice - ORD NO 2023-104 - SUP 2023-01 - 1741 N Hwy 377 Suite 116 Research Lab Use



City of Roanoke Notice of Public Hearing Zoning Amendment

NOTICE OF PUBLIC HEARING ZONING AMENDMENT

Roanoke Planning and Zoning Commission SUP 2023-01

THE ROANOKE PLANNING AND ZONING COMMISSION WILL HOLD A PUBLIC HEARING ON MONDAY, MARCH 6, 2023, TO CONSIDER AMENDING THE COMPREHENSIVE ZONING ORDINANCE OF THE CITY OF ROANOKE, TEXAS, FOR LOT 8R, BLOCK 1 OF THE BOBCAT CORNERS ADDITION, AN ADDITION TO THE CITY OF ROANOKE, DENTON COUNTY, TEXAS, BY CHANGING THE ZONING ON SAID TRACT OF LAND FROM LIGHT COMMERCIAL DISTRICT (LC) TO LIGHT COMMERCIAL DISTRICT – SPECIFIC USE PERMIT (LC-SUP) TO ALLOW A RESEARCH LAB (NON-HAZARDOUS) USE. THE PUBLIC HEARING WILL BE HELD AT 7:00 P.M. AT THE ROANOKE CITY HALL LOCATED AT 500 S OAK STREET, ROANOKE, TEXAS.

Roanoke City Council SUP 2023-01

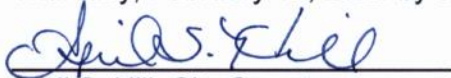
THE ROANOKE CITY COUNCIL WILL HOLD A PUBLIC HEARING ON TUESDAY, MARCH 14, 2023, TO CONSIDER AMENDING THE COMPREHENSIVE ZONING ORDINANCE OF THE CITY OF ROANOKE, TEXAS, FOR LOT 8R, BLOCK 1 OF THE BOBCAT CORNERS ADDITION, AN ADDITION TO THE CITY OF ROANOKE, DENTON COUNTY, TEXAS, BY CHANGING THE ZONING ON SAID TRACT OF LAND FROM LIGHT COMMERCIAL DISTRICT (LC) TO LIGHT COMMERCIAL DISTRICT – SPECIFIC USE PERMIT (LC-SUP) TO ALLOW A RESEARCH LAB (NON-HAZARDOUS) USE. THE PUBLIC HEARING WILL BE HELD AT 7:00 P.M. AT THE ROANOKE CITY HALL LOCATED AT 500 S OAK STREET, ROANOKE, TEXAS.

***THE CITY COUNCIL WILL HOLD IT'S PUBLIC HEARING ON TUESDAY, MARCH 28, 2023.**

THE MARCH 14, 2023 CITY COUNCIL MEETING HAS BEEN CANCELLED.

CERTIFICATION

I certify that the above notice was posted at City Hall, 500 South Oak Street, Roanoke, Texas, on Thursday, February 16, 2023 by 5:00 p.m.


April S. Hill, City Secretary

*Any person planning to attend this meeting that may require auxiliary aids or services should request accommodations two (2) days prior to the meeting by calling (817) 491-8152. **BRILLE IS NOT AVAILABLE.**

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AGENDA ITEM

TO: Planning and Zoning Commission

SUBJECT: Specific Use Permit (SUP 2023-01) Research Lab (Non-hazardous)

MEETING DATE: March 6, 2023

DEPARTMENT: Planning

ITEM SUMMARY:

Consideration and recommendation on a Specific Use Permit (SUP 2023-01) request from Sebastian Sobczak, amending the Comprehensive Zoning Ordinance of the City of Roanoke, Texas, for Lot 8R, Block 1 of the Bobcat Corners Addition, an addition to the City of Roanoke, Denton County, Texas, by changing the zoning on said tract of land from Light Commercial District (LC) to Light Commercial District – Specific Use Permit (LC-SUP) to allow a research lab (non-hazardous) use. The property is generally located on the West side of US Hwy 377 behind 7-Eleven, and has an address of 1741 N. Hwy 377, Suite 116. (SUP-2023-01 / Ordinance No. 2023-104)

INFORMATION:

Zoning:: PD 2010-112 Bobcat Corners

The Bobcat Corners PD was amended in 2018 (Ord. No. 2018-100) to allow uses in the Light Commercial- LC Zoning District.

The LC, Light Commercial, district is intended to provide a location for commercial and service-related establishments, such as wholesale product sales, welding/contractors shops, automotive repair services, upholstery shops, and other similar commercial uses. Uses in this district may utilize open storage areas that are screened from public view (see article VII, division 5 of this chapter). Some light manufacturing may also be allowed, in conformity with certain conditions as required herein. The uses envisioned for the district will typically utilize smaller sites and have operation characteristics which are generally not compatible with residential uses and some nonresidential uses. Convenient access to thoroughfares and collector streets is also a primary consideration.

USE CHART - APPENDIX 3. - SECTION 12.661 — Light Commercial- LC requires a Specific Use Permit (SUP) for a research lab (non-hazardous) use.



AGENDA ITEM

Surrounding Land Use

	<i>Existing Use</i>	<i>Zoning</i>	<i>Future Land Use Plan</i>
<i>North</i>	Vacant	Corp of Engineers	N/A
<i>East</i>	Commercial-Retail	PD Bobcat Corners	Commercial
<i>South</i>	Commercial-Retail	PD Bobcat Corners	Commercial
<i>West</i>	Garage Condominiums	PD Bobcat Corners	Commercial

STAFF RECOMMENDATION:

Staff recommends approval.

SPECIAL CONSIDERATION:

FINANCIAL CONSIDERATION:

ATTACHMENTS:

1. Application - SUP-2023-01 - Sebastian Sobezak 1741 N HWY 377 #116 for Lab Use
2. ORD NO 2023-104 - SUP 2023-01 - Rezone - Lot 8R Block 1 Bobcat Corners - LC-SUP for Research Lab use
3. Lab Information for SUP



CITY OF ROANOKE
500 S. OAK STREET
ROANOKE, TEXAS 76262
(817) 491-2411

SPECIAL USE PERMIT APPLICATION

Name of Applicant/Agent Sebastian Sobczak	Address, City, State, Zip 12 Cork Hill Road, Franklin NJ 07416	Phone Number 650-996-6339
Type of permit requested Research Lab (non-hazardous)	Name of Business Futurrex, Inc.	Email sasobczak@futurrex.com
Property Owner(s) Bobcat Corners, LLC	Address, City, State, Zip 1807 Keller Pkwy Suite 200 Keller TX 76248	Phone Number 214 637 4300
Legal Description - Lot/Block/Subdivision Lot 8R Block 1 Bobcat Corners	Property Address 1741 N Hwy 377	Present Zoning PD- Bobcat Corners with Light Commercial Uses Ord No 2018-100

Are there deed restrictions that would prevent this property from being used in the manner herein proposed? NO

Justification for request for Special Use Permit: We are moving our business to the City of Roanoke and it is considered a Research Lab (non-hazardous) per the Roanoke zoning ordinances 'Use Chart'. The underlying zoning for the property is considered Light Commercial (LC) which requires a Specific Use Permit under the zoning district.

Authorization:

I/We Bobcat Corners LLC owner(s) of the above described property do here by authorize _____ to act on my/our behalf in making and representing this special use permit application.

Owner(s) Signature

Date

Owner(s) Signature

Date

Attach the following:

Special Use Permit application fee of \$200.00**. Attach two (2) copies of the Metes & Bounds description of the property and a survey map (11x17) of the property. One electronic copy in a pdf format due at least 5 days prior to Council Meeting.

Applicants Signature

2/6/2023

Date

**Fees are subject to change as amended by Ordinance.

FOR OFFICE USE ONLY

Application Fee Paid 2/6/2023 by JW	P&Z Meeting 03/06/2023	CC Meeting 03/14/2023	File for Record SUP- 2023 - 01
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8/23/2019

ORDINANCE No. 2023-104

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF ROANOKE, TEXAS, AMENDING THE COMPREHENSIVE ZONING ORDINANCE OF THE CITY OF ROANOKE, TEXAS, BY GRANTING A CHANGE IN ZONING FOR LOT 8R, BLOCK 1 OF THE BOBCAT CORNERS ADDITION, AN ADDITION TO THE CITY OF ROANOKE, DENTON COUNTY, TEXAS, AND MORE PARTICULARLY DESCRIBED AND OR DEPICTED IN EXHIBIT "A" WHICH IS ATTACHED HERETO AND INCORPORATED HEREIN FOR ALL PURPOSES, BY AMENDING THE UNDERLYING ZONING FOR SAID TRACT OF LAND FROM LIGHT COMMERCIAL DISTRICT (LC) TO LIGHT COMMERCIAL – SPECIFIC USE PERMIT DISTRICT (LC-SUP) TO ALLOW RESEARCH LAB (NON-HAZARDOUS) USE; PRESCRIBING THE PERMISSIBLE USES THEREOF; PROVIDING A PENALTY CLAUSE; PROVIDING A SEVERABILITY CLAUSE; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, after public notice and public hearing as required by law, the Planning and Zoning Commission for the City of Roanoke, Texas, has recommended that the official zoning map of the City of Roanoke, Texas, be amended to reflect that the zoning for Lot 8R, Block 1 of the Bobcat Corners Addition, an addition to the City of Roanoke, Denton County, Texas, and being more particularly described and depicted in **Exhibit A** of this Ordinance, which is attached hereto and incorporated herein for all purposes, be changed from Light Commercial District (LC) to Light Commercial District – Specific Use Permit (LC-SUP) to allow a research lab (non-hazardous) use; and

WHEREAS, the Planning and Zoning Commission of the City of Roanoke, Texas, and the City Council of the City of Roanoke, Texas, in compliance with the laws of the State of Texas, have given the requisite notices by publication and otherwise, and have held due hearings and afforded a full and fair hearing to all property owners generally and to all persons interested, and the City Council of the City of Roanoke, Texas, is of the opinion and finds that said changes should be granted and that the Comprehensive Zoning Ordinance should be amended.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ROANOKE, TEXAS:

Section 1. FINDINGS INCORPORATED

The findings set forth above are incorporated into the body of this Ordinance as if fully set forth herein.

Section 2.

That the Comprehensive Zoning Ordinance and Map of the City of Roanoke, Texas, duly passed by the governing body of the City of Roanoke, Texas, as heretofore amended, be and the same is hereby amended to grant a change in zoning for Lot 8R, Block 1 of the Bobcat Corners Addition, an addition to the City of Roanoke, Denton County, Texas, and being more particularly described and depicted in **Exhibit A** of this Ordinance, which is attached hereto and incorporated herein for all purposes, be changed from Light Commercial District (LC) to Light Commercial District – Specific Use Permit (LC-SUP) to allow a research lab (non-hazardous) use.

Section 3.

The City Secretary is directed to engross and enroll this Ordinance in the Code of Ordinances of the City of Roanoke and to reflect this change of zoning on the official zoning map of the City of

Roanoke, Texas.

Section 4. PENALTY CLAUSE

Any person, firm, or corporation violating any of the provisions or terms of this Ordinance shall be guilty of a misdemeanor and upon conviction, shall be fined a sum not to exceed \$2,000.00 for each offense, and each and every violation or day such violation shall continue or exist, shall be deemed a separate offense.

Section 5. SEVERABILITY CLAUSE

It is hereby declared to be the intention of the City Council that the phrases, clauses, sentences, paragraphs and sections of this Ordinance are severable, and if any phrase, clause, sentence, paragraph or section of this Ordinance shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs and sections of this Ordinance, since the same would have been enacted by the City Council without the incorporation of this Ordinance of any such unconstitutional phrase, clause, sentence, paragraph or section.

Section 6. EFFECTIVE DATE

This Ordinance shall become effective immediately upon its passage and publication as required by law.

PASSED, APPROVED AND ADOPTED by the City Council of the City of Roanoke, Texas, on this the 14th day of March, 2023.

APPROVED:

Carl E. Gierisch, Jr., Mayor

ATTEST:

April S. Hill, City Secretary

APPROVED AS TO FORM:

Jeff Moore, City Attorney

Exhibit A

Legal Description and/or Depiction
Lot 8R, Block 1, Bobcat Corners



CITY OF ROANOKE
500 S. OAK STREET
ROANOKE, TEXAS 76262
(817) 491-2411

SPECIAL USE PERMIT APPLICATION

Name of Applicant/Agent Sebastian Sobczak	Address, City, State, Zip 12 Cork Hill Road, Franklin NJ 07416	Phone Number 650-996-6339
Type of permit requested Research Lab (non-hazardous)	Name of Business Futurrex, Inc.	Email sasobczak@futurrex.com
Property Owner(s) Bobcat Corners, LLC	Address, City, State, Zip 1807 Keller Pkwy Suite 200 Keller TX 76248	Phone Number 214 637 4300
Legal Description - Lot/Block/Subdivision Lot 8R Block 1 Bobcat Corners	Property Address 1741 N Hwy 377	Present Zoning BP

Are there deed restrictions that would prevent this property from being used in the manner herein proposed? NO

Justification for request for Special Use Permit: We are moving our business to the City of Roanoke and it is considered a Research Lab (non-hazardous) per the Roanoke zoning ordinances 'Use Chart'. The underlying zoning for the property is considered Light Commercial (LC) which requires a Specific Use Permit under the zoning district.

Authorization:

I/We Bobcat Corners LLC owner(s) of the above described property do hereby authorize _____ to act on my/our behalf in making and representing this special use permit application.

Owner(s) Signature

Date

Owner(s) Signature

Date

Attach the following:

Special Use Permit application fee of \$200.00**. Attach two (2) copies of the Metes & Bounds description of the property and a survey map (11x17) of the property. One electronic copy in a pdf format due at least 5 days prior to Council Meeting.

Applicants Signature

Applicants Signature

2/6/2023

Date

**Fees are subject to change as amended by Ordinance.

FOR OFFICE USE ONLY

Application Fee	P&Z Meeting	CC Meeting	File for Record SUP- _____ - _____
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8/23/2019

EXHIBIT "A"
LEGAL DESCRIPTION

GF# 22-3806-SL

TRACT 1:

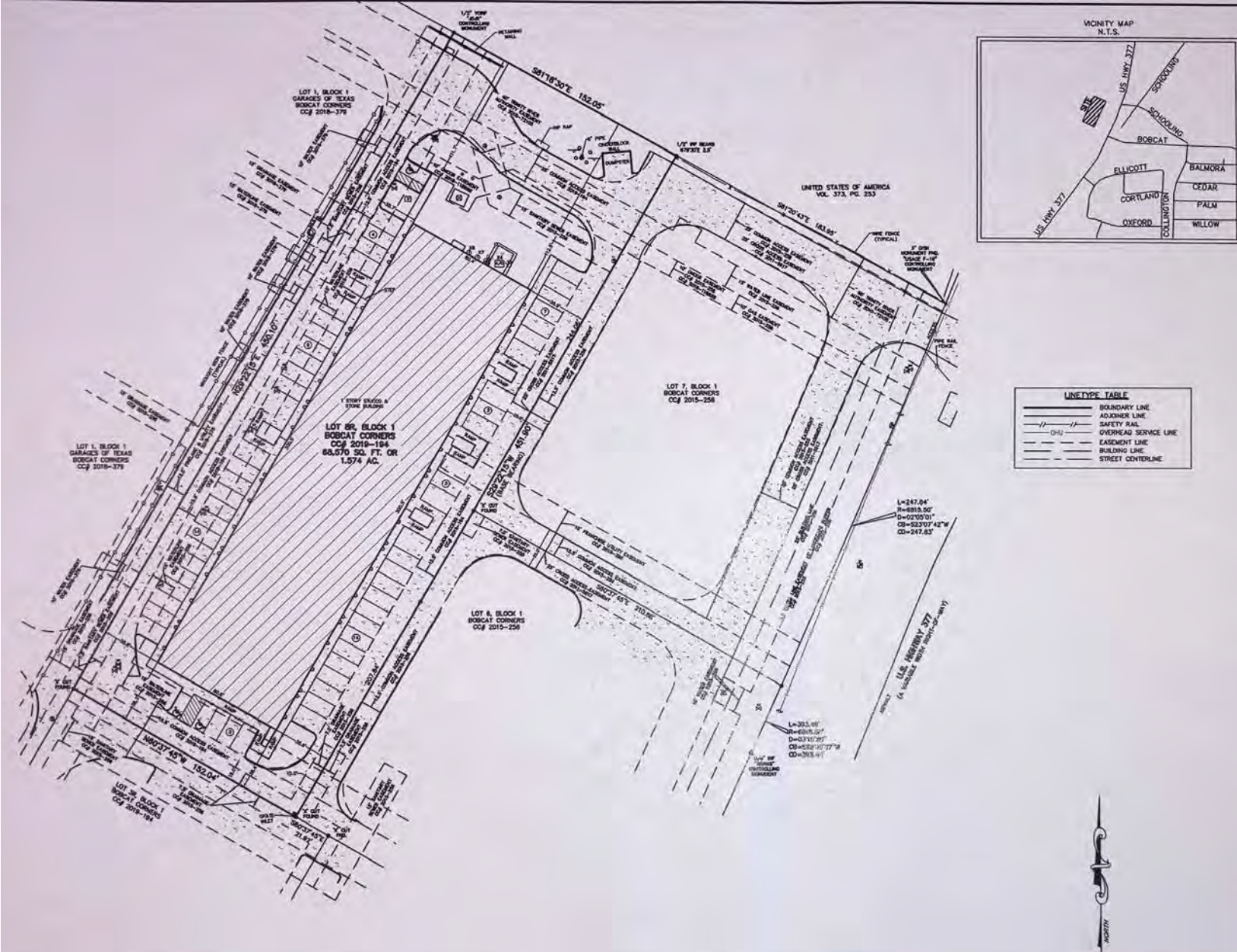
LOT 8R, BLOCK 1, FINAL PLAT OF LOT 3R & 8R, BLOCK 1, BOBCAT CORNERS, A SUBDIVISION IN DENTON COUNTY, TEXAS, ACCORDING TO THE MAP OR PLAT THEREOF RECORDED UNDER PLAT NO. 2019-194.

TRACT 2:

NON-EXCLUSIVE 31' AND 25' CROSS ACCESS EASEMENT AS ESTABLISHED BY RECIPROCAL EASEMENT AGREEMENT BY AND BETWEEN JEFFREY S. RYAN TO HUNTER ROANOKE I, L.P., FILED JANUARY 18, 2011, RECORDED UNDER COUNTY CLERK INSTRUMENT NO. 2011-5616, OPR, DENTON COUNTY, TEXAS, AND AMENDED IN 2013-106762, AND CORRECTED IN 2013-135757, OPR, DENTON COUNTY, TEXAS.

TRACT 3:

NON-EXCLUSIVE 25' AND 31' COMMON ACCESS EASEMENTS AS ESTABLISHED BY FINAL PLAT LOTS 2-10, BLOCK 1, BOBCAT CORNERS, A SUBDIVISION IN DENTON COUNTY, TEXAS, RECORDED UNDER PLAT NO. 2015-256, AND FINAL PLAT LOT 3R & 8R, BLOCK 1, BOBCAT CORNERS, A SUBDIVISION IN DENTON COUNTY, TEXAS, RECORDED UNDER PLAT NO. 2019-194.



This is to certify that I have, this date, made an on the ground survey of the property located at 1741 North Highway 377 in the City of Roanoke, Texas, described as follows:

Lot 8R, Block 1, Final Plat of Lot 3R & 8R, Block 1, Bobcat Corners, a subdivision in Roanoke, Texas, according to the map or plat thereof recorded under Plat No. 2018-194.

NOTES CORRESPONDING TO SCHEDULE B:

1. The following restrictive covenants of record itemized below:

The following Recorded as Instrument No. 2014-8998, of the County Clerk's Office of Denton County, Texas, but omitting any covenant or restriction based on race, sex, handicap, familial status or national origin unless and only to the extent that said instrument No. 2014-8998, of the County Clerk's Office of Denton County, Texas, does not discriminate against handicapped persons.

10L Terms, conditions, easement, building setback lines and other matters as set forth in the Official Records of Denton County, Texas, does affect and shown hereon.

10J Easement by and between Avery Family Limited Partnership, a Texas limited partnership, and Electric Delivery Company LLC, a Delaware limited liability company, filed October 5, 2018, Instrument No. 2018-118688, of the County Clerk's Official Records of Denton County, Texas, does affect and shown hereon.

This survey was performed in connection with the transaction described in GF No. 2022-001, WFO National Title Insurance Company, effective date of January 7, 2022 and issued on January 7, 2022, and all subsequent commitments for information regarding encumbrances on the property and surveyor did not abstract property for easements and/or other restrictions. The use of this survey describes the same land as the legal description in the title of this survey for any other purpose or by other parties shall be at their own risk and UNDERSIGNED IS NOT RESPONSIBLE TO OTHERS FOR ANY LOSS RESULTING FROM RELIANCE ON THIS SURVEY.

The term "certify" or "certificate" as shown and used hereon indicates an expression of opinion regarding the facts of the survey and does not constitute a warranty or guarantee, expressed or implied; and is exclusively to the parties involved in, and limited to, the transaction described in the title of this survey, and is not binding on any other parties.

NOTES:

1. IRF = Iron Rod Found
2. YCRP = Iron Rod Found with yellow cap
3. Basis of Bearing = Based on the Southeast line (South 28 deg. 22 min. 15 sec. East) of Lot 3R & 8R, Block 1, Final Plat of Lot 3R & 8R, Block 1, Bobcat Corners, a subdivision in Roanoke, Texas, according to the map or plat thereof recorded under Plat No. 2018-194.
4. There are no observable evidence of cemeteries on site.
5. There are no observable evidence of earth moving work, building construction or other work within the recent months.
6. There are no changes in street right-of-way lines either completed or proposed from the controlling jurisdiction. No observable evidence of recent street or sidewalk repairs.
7. There are no observable evidence of site use as a solid waste dump, dump or other use.
8. This boundary forms a mathematical closed figure, with no gaps, gaps, or overlaps.
9. This is an above-ground survey. The underground utilities, if shown, are based on records provided by the various utility companies and these locations should be considered as approximate. There may be additional underground utilities not shown on this drawing.
10. Property has indirect access to North Highway 377 through Common and Co. Easements recorded in CC#s 2015-256 and 2011-5617, Official Public Records, Denton County, Texas, as shown hereon.

To: WFO National Title Insurance Company, ASB# 1, LP

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2021 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes Items 1 through 10, 12, 13, 14, 15, 16, 17, 18 of Table A thereof. The latest field work was completed on 1/31/2022. Date of Plat or Map: 2/1/2022

DATE: 2/1/2022
 by the FLOOD INSURANCE RATE MAPS for Denton County, the subject property Does lie within a Special Flood Hazard Area (100 Year Flood), Map date 4/18/2011 at No. 48121C0515G subject lot is located in Zone "X" of within an identified flood hazard area, this Flood Statement does not imply that the property or structures thereon will be free from flooding or flood damage. On rare occasions floods can occur and flood heights may be increased by man-made or other factors. This Flood Statement shall not create liability on the part of the Surveyor.

LEGEND

ER	★	FIRE HYDRANT	⊙	WATER MANHOLE	⊙	—	SIGN
TROL VALVE	⊙	WATER METER	⊙	TRAFFIC SIGNAL POLE	⊙	—	LIGHT POLE
E PEDESTAL	⊙	FUEL PORT	⊙	SWB MANHOLE	⊙	—	TYPICAL FENCE
OLE	⊙	WATER VALVE	⊙	GAS MANHOLE	⊙	—	CONCRETE
Y	⊙	TRANSFORMER PAD	⊙	VAULT	⊙	—	BOLLARD
HOLE	⊙	ELECTRIC METER	⊙	HANDICAP SPACE	⊙	—	COVERED AREA
IT	⊙	STORM DRAIN MANHOLE	⊙	A/C PAD	⊙	—	

Errors: The Client or Client's Representatives will have 45 days from the date the survey was issued to change any mispellings or any errors on the survey report, after this time has expired all parties involved must accept the survey as issued.

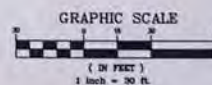
COPYRIGHT © PEISER & MANKIN SURVEYING, LLC. ALL RIGHTS RESERVED. NO PART OF THIS DRAWING MAY BE REPRODUCED BY PHOTOCOPIING, RECORDING OR BY ANY OTHER MEANS, OR STORED, PROCESSED OR TRANSMITTED IN OR BY ANY COMPUTER OR OTHER SYSTEMS WITHOUT THE PRIOR WRITTEN PERMISSION OF THE SURVEYOR. COPIES OF THIS SURVEY WITHOUT THE ORIGINAL SIGNATURE ARE NOT VALID.

ALTA/NSPS LAND TITLE SURVEY

LOT 8R

1741 NORTH HIGHWAY 377

ROANOKE, TEXAS 76262

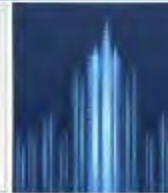
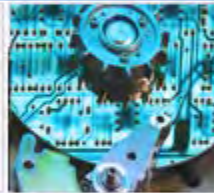
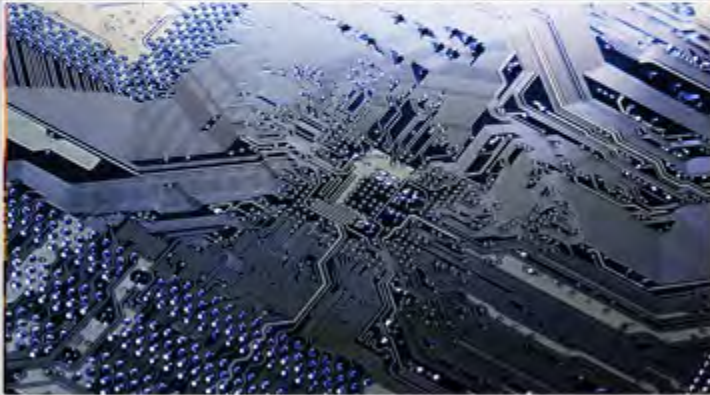


NO.	DATE	REVISION
1.		
2.		
3.		

JOB NO: 21-0028 LP	PEISER & MANKIN SURVEYING
DATE: 2/2/2022	www.peisersurveying.com
FIELD DATE: 1/31/2022	
SCALE: 1" = 30'	
FIELD: J.M.K.	
DRAWN: J.M.K.	
CHECKED: T.R.L.	

PRELIMINARY, THIS SHALL NOT BE USED FOR ANY PURPOSES WITHOUT THE SIGNATURE OF THE SURVEYOR.

Timothy R. Mankin
 Registered Professional Land Surveyor
 No. 120288-100



Company Overview 2023

Futurrex, Inc.
Productivity Tools

01-2023

Company Overview

- Diversified innovator of advanced specialty thin-films for microfabrication
 - Provider to legacy semiconductor markets
 - Enabler for new growth markets
- Founded in 1985
- Headquarters located in Franklin, New Jersey, USA
- High-growth, multi-national corporation, profitable for 25+ years
- Geographies of operations include North America, Asia-PAC, Europe
- Diversified technology base
 - Markets: Analog Microelectronics, Optoelectronics/Photonics/LED/OLED, Solar PV, MEMS, Biochips, Microfluidics, Graphic Printing, Power Devices, Semiconductor Packaging
 - Solutions: High-Performance Photoresists, Dopant Coatings, Planarizing/Barrier Coatings, Spin-On-Glass, Barrier Layers, Wet Chemistry Processes
- Customers: Multinational corporations to venture-backed device & systems startups
- Conservative, debt-free privately held ownership structure
- Brand-name global partnerships
- ISO 9001 certified

End Product Applications

- LEDs
 - OLED / LED / HBLED
- MEMS
 - Gravity Sensors / Accelerometers / Gyroscopes
- Solar PV
 - Thin film, III/V, c-Si, a-Si
- Microfluidics & Biochips
 - Genome Analysis, Diagnostics, Rapid Assays
- Optoelectronics / Photonics
 - VCSELs, Waveguides, Refractive Filters, Microlenses
- Packaging
 - TSV, WLP, Bumps, BGA, Flip Chip
- Power Devices, MMICs & RF Components

Examples of LED End Products



Displays

Commercial LEDs



Flash Modules



General LED Lighting



High-Brightness LEDs

Futurrex Advantages

- Highly innovative formulator:
 - Futurrex has a long history of being an enabler in creating cutting-edge products in various fields
 - Hundreds of patents filed and pending using Futurrex materials
- *Ability to rapidly tailor a product or create a totally new product to satisfy a customer's specific requirements*
- Outstanding customer/R&D support
- Futurrex pioneered the following breakthrough concepts:
 - Amplified negative resists for lift-off process
 - Polysiloxane based spin-on glass
 - Planarizing coatings for planarization etch back
 - Non-Spin-On-Glass based spin-on dopants

- Our customers have worked with us in creating strong IP portfolios
 - Transistors, Packaging, MEMS, Displays, OLEDs, Waveguides, VCSELs, Imaging, Plating, Carbon Nanotubes, Microfluidics, Flip-chips are just some examples of breakthroughs we have enabled
 - Hundred filed provisional patents in the USPTO office awaiting approval

APPROVED PATENTS

7,450,295	Methods for producing MEMS with protective coatings us:	20090002915
7,412,767	Microprobe tips and methods for making	20080315459
7,363,705	Method of making a contact	20080305653
7,298,084	Methods and displays utilizing integrated zinc oxide row	20080305248
7,288,327	Plated structures or components	20080299495
7,273,812	Microprobe tips and methods for making	20080290066
7,241,689	Microprobe tips and methods for making	20080230391
7,195,989	Electrochemical fabrication methods using transfer platir	20080121343
7,109,107	Method for creating flip-chip conductive-polymer bumps	20080108221
7,090,783	Lithography-based patterning of layer-by-layer nano-ass	20080105647
7,087,321	Organic light emitting devices having reduced pixel shrir	20080102408
7,029,765	Organic light emitting devices having reduced pixel shrir	20070261140
7,005,361	Providing high precision resistance in an integrated circi	20070259128
6,909,831	Optical waveguide	20070206267
6,873,638	Laser diode chip with waveguide	20070134939
6,832,034	Optical waveguide	20070111090
6,586,791	Transistor insulator layer incorporating superfine cerami	20070036951
6,208,680	Optical devices having ZNS/CA-MG-fluoride multi-layere	20070020916
6,169,756	Vertical cavity surface-emitting laser with optical guide	20060286829
6,027,595	Method of making optical replicas by stamping in photor	20060260943
5,721,801	Membrane optical waveguide device and method of fabr	20060228974
5,702,767	Non-Aminic photoresist adhesion promoters for microele	20060134448
5,667,920	Process for preparing a color filter	20060132531
5,614,758	Fully walled emitter-base in a bipolar transistor	20060112550
5,500,243	Process for planarizing substrate surfaces for magnetic	20060091793
5,462,888	Process for manufacturing semiconductor BICMOS devi	20060053625
5,306,649	Method for producing a fully walled emitter-base structur	20060051948
5,140,396	Filter and solid state imager incorporating this filter	20060011486
5,059,500	Process for forming a color filter	20050253606
4,738,761	Shared current loop, multiple field apparatus and proces	20050230261
4,676,868	Method for planarizing semiconductor substrates	20050221644
...		...

PENDING PATENTS

Micro-electromechanical voltage tunable capacitor and	20050194258
ARTICLES AND METHODS FOR REPLICATION OF MI	20050176238
Compliant off-chip interconnects for use in electronic pac	20050173374
CARBON NANOTUBE ARRAYS FOR FIELD ELECTRO	20050135725
Methods of fabricating metal contact structures for laser	20050106329
Method of Fabricating Polymer Modulators With Etch Str	20050045484
Methods for Electrochemically Fabricating Structures Us	20050032375
Electrochemical Fabrication Methods Incorporating Diele	20050032323
Microprobe Tips and Methods for Making	20050032272
Methods for Electrochemically Fabricating Structures Us	20050023565
Microstructure and method for producing microstructures	20050023148
CARBON NANOTUBE ARRAYS FOR FIELD ELECTRO	20040241495
METHOD FOR CONTROLLED DENSITY GROWTH OF	20040227614
Methods for producing MEMS with protective coatings us:	20040214038
FABRICATION OF ENCLOSED NANOCHANNELS USIF	20040197065
Micro-Aluminum Galvanic Cells and Method for Construc	20040134882
Microfabrication using replicated patterned topography	20040099877
Methods for forming flexible column die interconnects ar	20040070048
Microprobe tips and methods for making	20040008959
MASK AND METHOD FOR ELECTROKINETIC DEPOS	20030007535
Methods of making displays	20050215046
Plated structures or components	20050199583
Fluidic structures	...
Microprobe tips and methods for making	
Methods and displays utilizing integrated zinc oxide row	and column drivers in conjunction with organic light emitting diodes
Microprobe tips and methods for making	
Microprobe tips and methods for making	
Methods for electrochemically fabricating structures using	adhered masks, incorporating dielectric sheets, and/or seed layers that are partially removed
Microprobe tips and methods for making	
Electrochemical fabrication methods incorporating dielectric materials and/or	using dielectric substrates
Microprobe tips and methods for making	

PENDING PATENTS

Electrochemical fabrication methods incorporating dielectric materials and/or
Electrochemical fabrication methods incorporating dielectric materials and/or
Electrochemical fabrication methods incorporating dielectric materials and/or
Laser submounts with standoff structures
Deposition and patterning process
Electrochemical fabrication process using directly patterned masks
Methods for electrochemically fabricating structures using adhered masks,
Flat profile structures for bipolar transistors
METHOD FOR CREATING FLIP-CHIP CONDUCTIVE-POLYMER BUMPS
Healing of micro-cracks in an on-chip dielectric
Methods for electrochemically fabricating structures using adhered masks,
Organic light emitting devices having reduced pixel shrinkage
Providing high precision resistance in an integrated circuit using a thin film
Organic light emitting devices having reduced pixel shrinkage
Optical waveguide
UV-curable polymerizable mixture
Healing of micro-cracks in an on-chip dielectric
Providing high precision resistance in an integrated circuit using a thin film
Optical waveguide
Laser diode chip with waveguide
Electrochemical fabrication methods incorporating dielectric materials and/or
Electrochemical fabrication methods incorporating dielectric materials and/or

Global



Product Categories

■ Negative Photo Resists

- Enhanced adhesion negative resists
- Advanced processing negative resists
- Negative resists for lift-off process
- Heat resistant negative resists
- Ultra-thick negative resists
- Hydrophobic resists
- Negative aqueous resists

■ Positive Photo Resists

- Enhanced adhesion positive resists

■ 14 Major Product Lines

- 180+ SKUs

■ All products applied by

- Spin, immersion, spray, dip, pen or inkjet printer

■ Non-Lithographic Coatings

- Planarizing, Protective, Temporary Bonding
- Spin-on Glasses
- Spin-on Dopants

■ Auxiliary Chemicals

- Edge Bead Removers
- Resist Developers
- Resist Removers

Amplified Negative Resist Categories

- Enhanced adhesion negative resists
 - Advanced application negative resists
 - Negative resist for lift-off
 - Heat-resistant negative resists
 - Thick negative resists
 - Hydrophobic resists
-
- *Many of these formulations are proven performers which are used at numerous leading manufacturers*

Product ID Explanation

■ NR9-3000PY



Lift-Off Application

Flexibility Component

Thickness (nm) @ 3000 rpm / 40 s

Product Family

Photosensitivity Component

Tone Category

■ Tone Category

- Defines Positive, Negative or Tone-Agnostic processing

■ Photosensitivity Component

- Defines the photosensitivity capabilities of the product

■ Product Family

- Defines the appropriate product family for the customer application

■ Thickness

- Defines the thickness of the product, in nm, after spinning at 3000 rpm for a 40 s duration

■ Flexibility Component

- Defines the use of plasticizers or other components

■ Lift-Off Application

- Defines lift-off capabilities of the product

Enhanced Adhesion NR Thin Films

- Standard High Sensitivity

NR9-250P

NR9-500P

NR9-1000P

NR9G-1000P

NR9-1500P

NR9G-1500P

NR9-3000P

NR9G-3000P

NR9-6000P

NR9G-6000P

NR9-8000

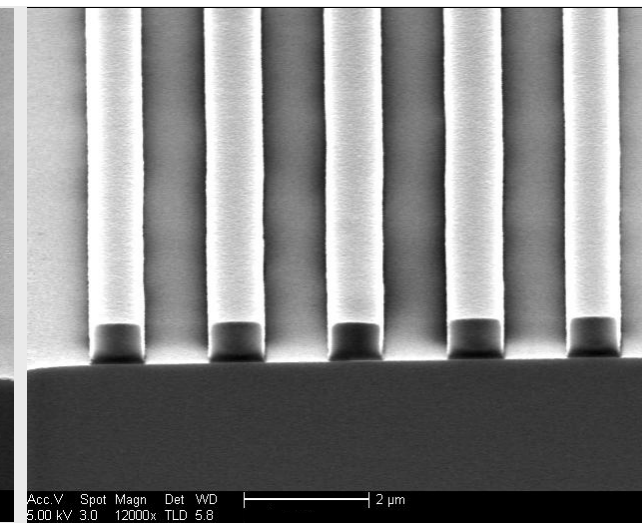
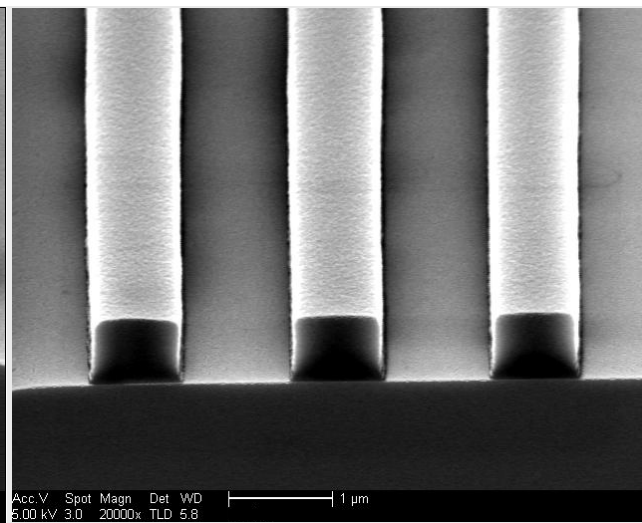
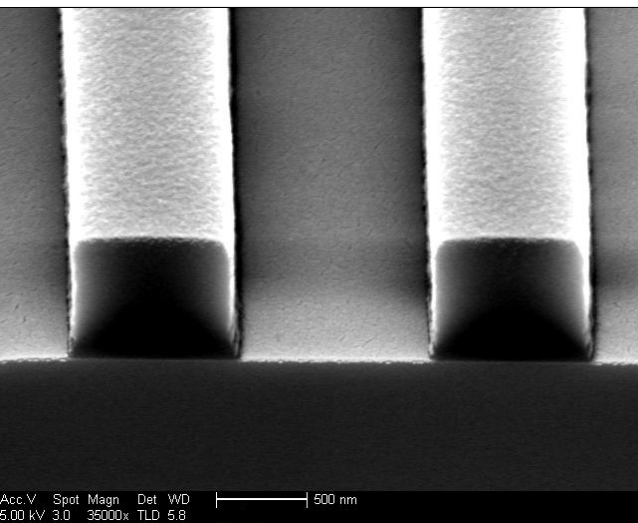
NR9G-8000

- Applications

- Masking in wet and dry etchings and plating.

Negative Resists for Wet Etching

- Futurrex NR9-1000P thin film is used for enhanced adhesion, etch applications and processes below 100°C.
- The following SEM image is of NR9-1000P geared for etch applications at approximately 1.0μm thickness:



Advanced Processing NR Thin Films

- Standard High Sensitivity

NR7-70P

NR7-100P

NR7-250P

NR7-500P

NR7-1000P

NR76G-1000P

NR7-1500P

NR76G-1500P

NR7-1500P

NR76G-1500P

NR7-3000P

NR76G-3000P

NR7-6000P

NR76G-6000P

NR5-8000

NR76G-8000P

- Applications

- Masking in high energy RIE, ion milling, and ion implantation processes when high thermal resistance, high crack resistance and/or high etch selectivity are required
- Formation of molds in fabrication of microfluidic devices

Negative Resists for RIE

- Specific applications
 - Through-Silicon Vias (TSV)
 - Cryogenic Etch
 - Bosch Process

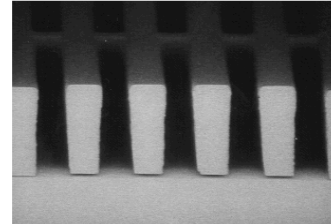


Figure 1: Futurrex NR5-8000, 4.5:1 AR
 Example of resist resolution.
 Film thickness: 54 μm ,
 Mask dimension: 12 μm line/space
 Exposure dose: 1100 mJ/cm²,
 Focus offset: -15 μm .
 Exposure tool: Ultratech Stepper Saturn Model, i-line

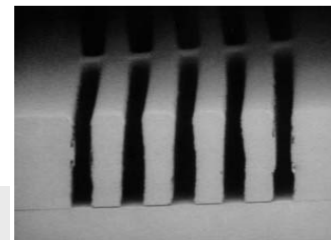


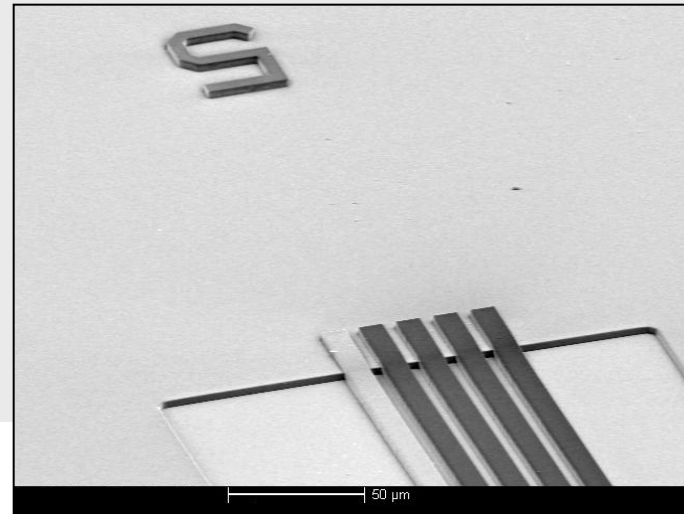
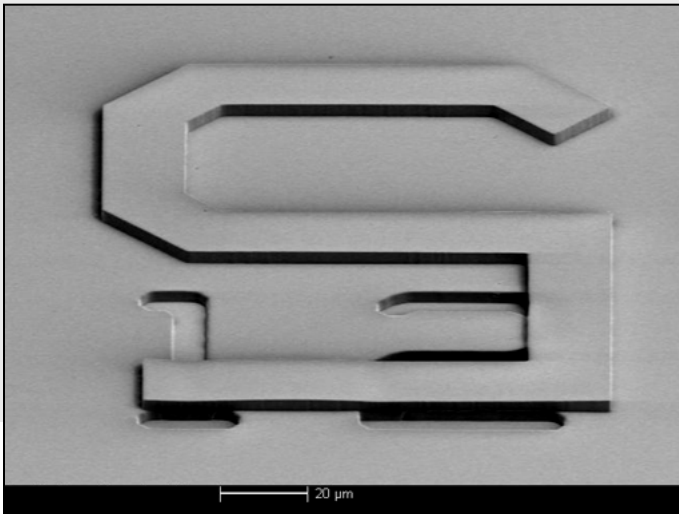
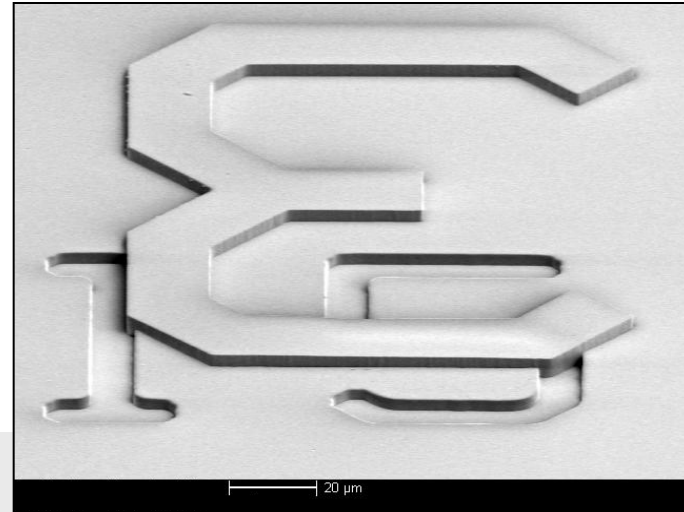
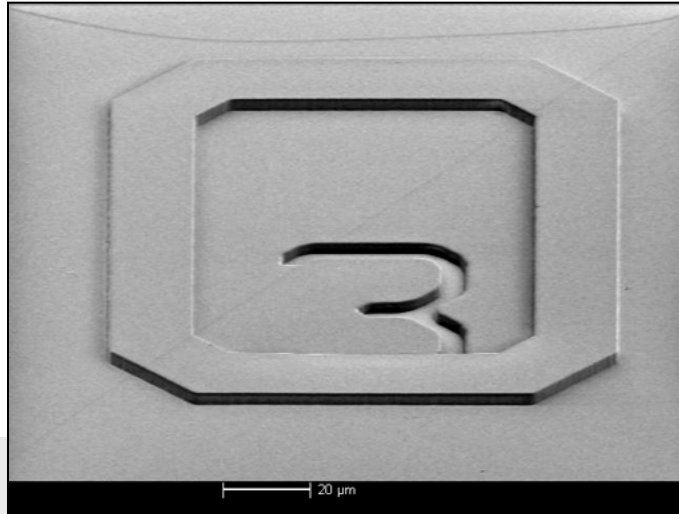
Figure 2: Futurrex NR5-8000, 6.0:1 AR
 Example of resist resolution.
 Film thickness: 54 μm ,
 Mask dimension: 9 μm line/space
 Exposure dose: 1100 mJ/cm²,
 Focus offset: -15 μm .
 Exposure tool: Ultratech Stepper Saturn Model, i-line

Resolution capability of NR5-8000



Pattern of 25 μm thick NR5-8000 resist over 20 μm tall features etched into silicon in MEMS devices

NRs for Permanent Applications – Hard bake plus overcoat (NR7G-3000P)



Lift Off NRs



Standard	High Sensitivity	High Sensitivity & Heat Resistance	Bottom undercut	g-/h- line compatible
NR9-500PY	NR97-500PY	NR77-500PY	NR92G-6000P	NR3G-3000PY
NR9-1000PY	NR97-1000PY	NR77-1000PY	NR77-5000PY1	NR95g-1500PY
NR9-1500PY	NR97-1500PY	NR77-1500PY	NR96-4000PY	NR95g-3000PY
NR9-3000PY	NR97-3000PY	NR77-3000PY		NR74g-3000PY
NR9-6000PY	NR9g-3000PY	NR77-5000PY		
	NR97-6000PY	NR77-12000PY		
	NR26-12000PY	NR77-20000PY		
	NR26-25000PY			

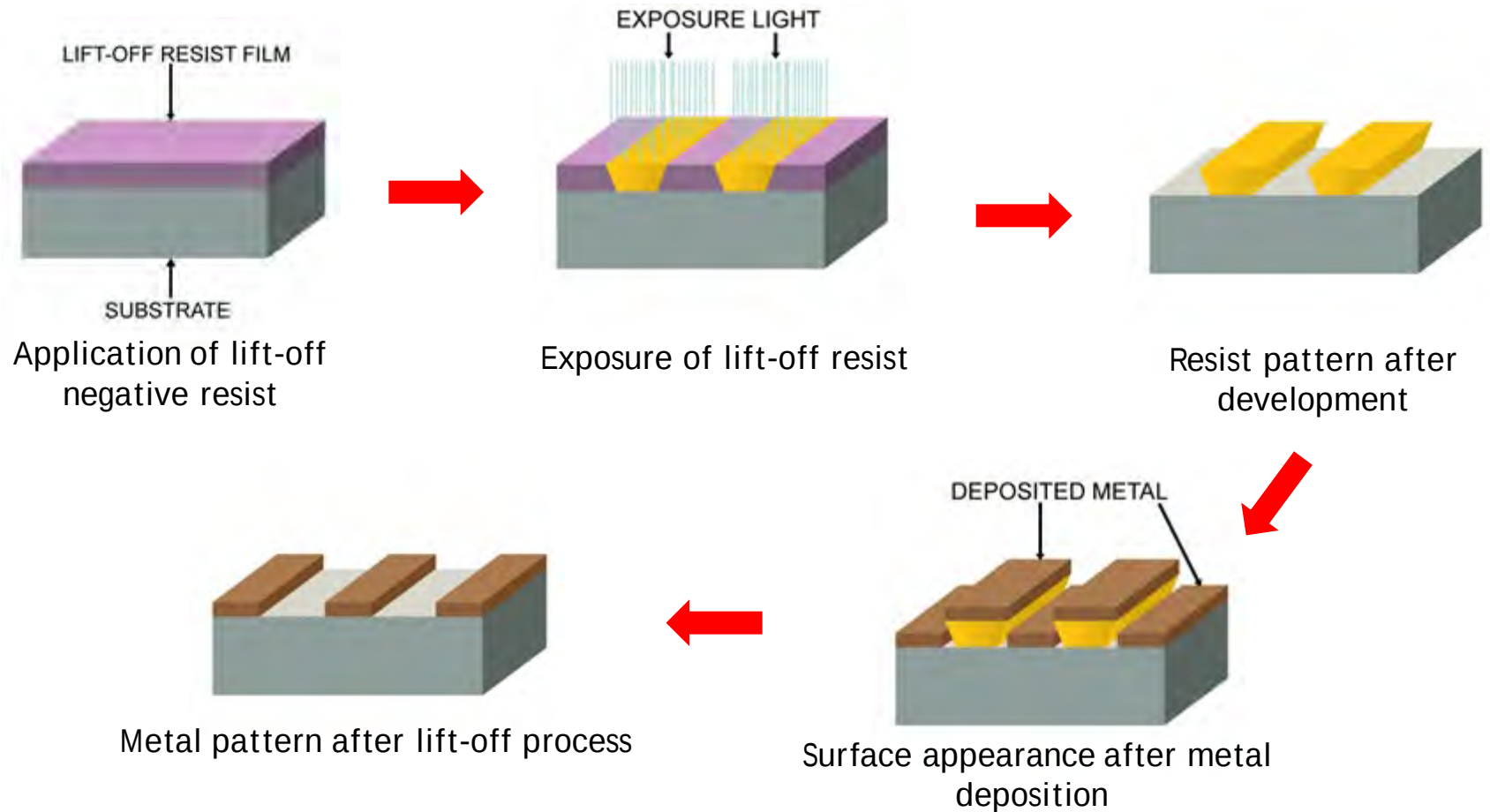
Futurrex offers the highest sensitivity commercially available lift-off resists

Applications: Facilitation of lift-off process

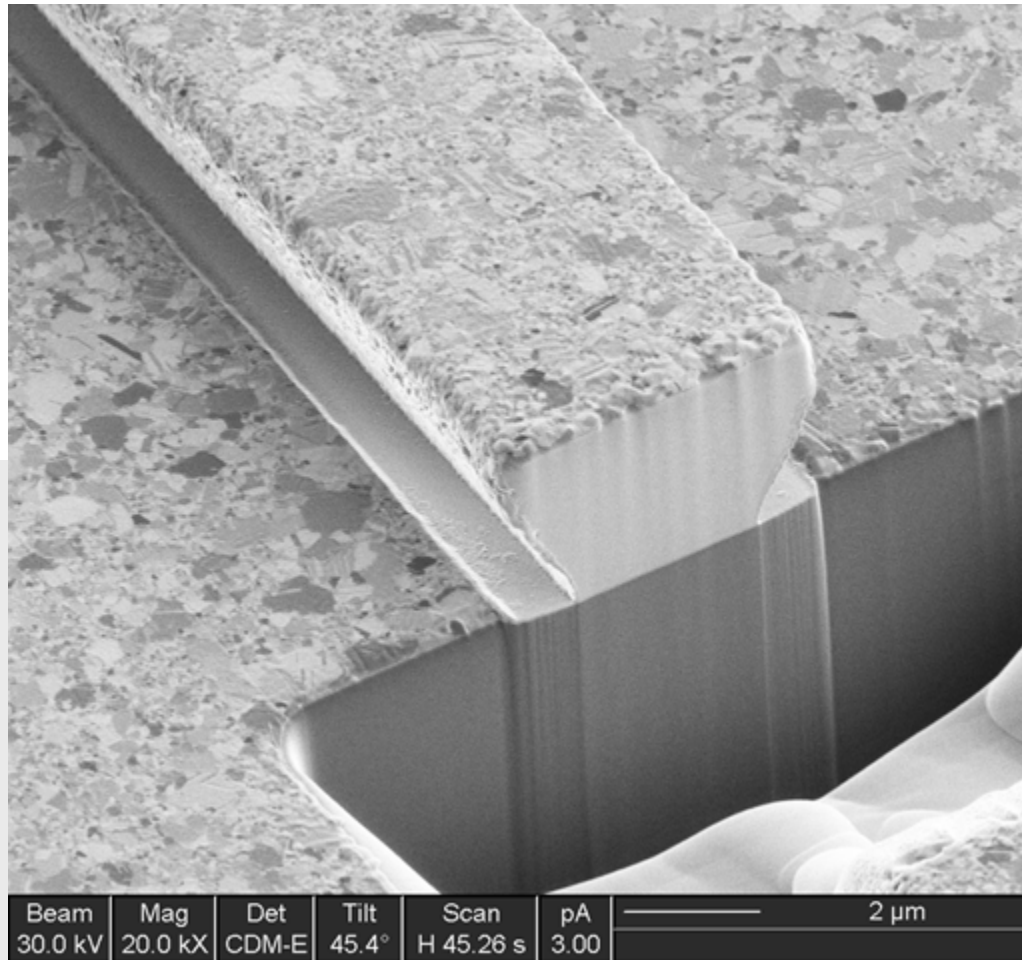
- NR9x-series are designed for metal depositions which do not exceed 110°C
- NR7x-series allow for easy lift-off even when temperature during metal deposition exceeds 275°C
- Bottom undercut resists allow for easy lift-off even with conformal (isotropic) metal deposition tools

Confidential and proprietary - Do not distribute or copy

Single-Layer Lift-Off Process

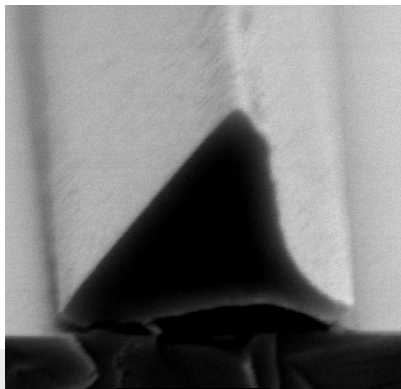


Single-Layer Lift-Off Process

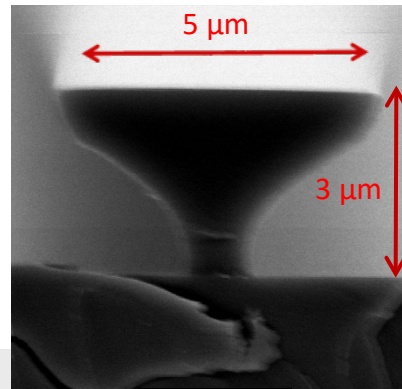


- SEM of 3 μm thick pattern of NR9g-3000PY with deposited metal

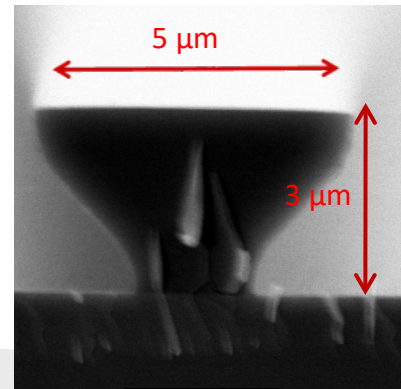
NR9-3000PY - Superior Processing Window



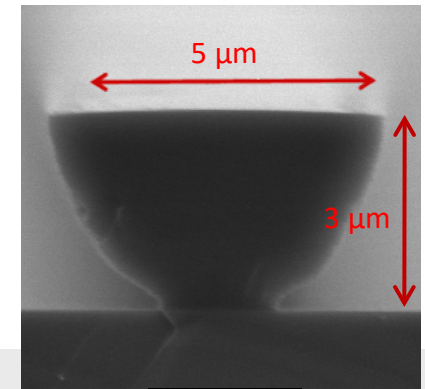
220mj



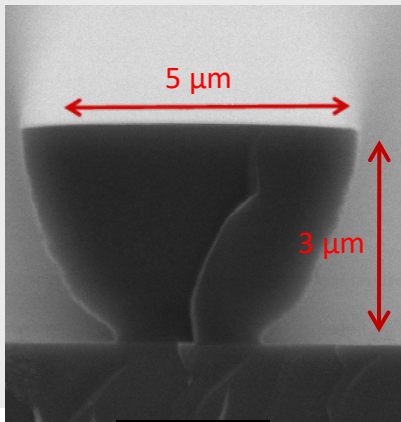
240mj



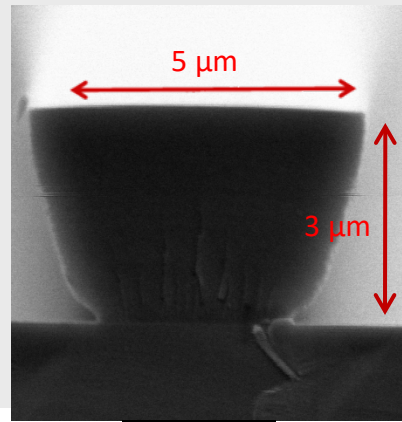
260mj



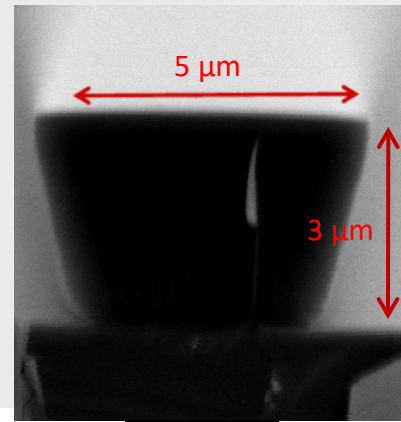
280mj



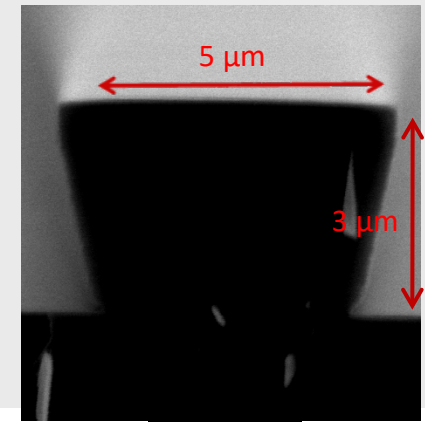
300mj



320mj



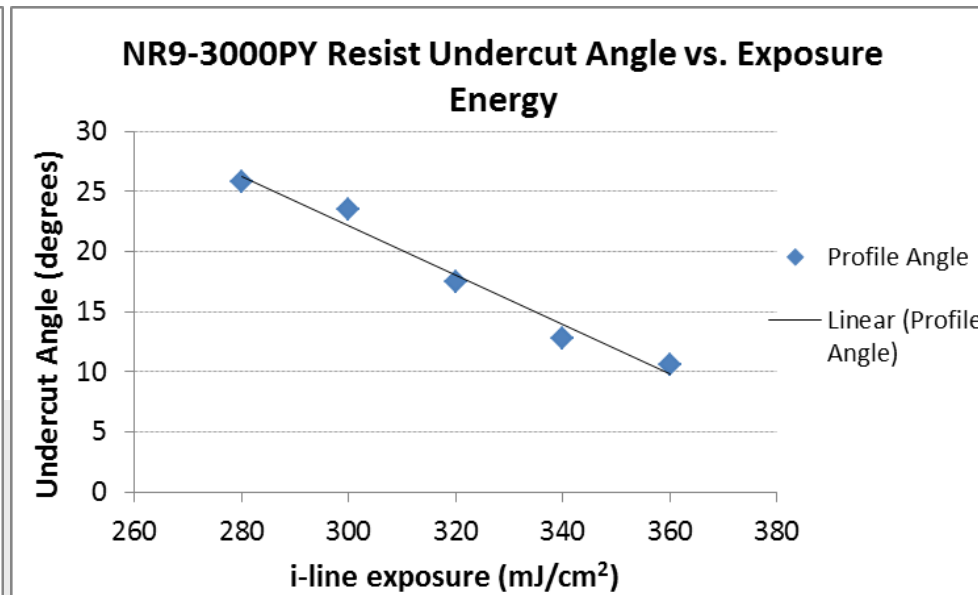
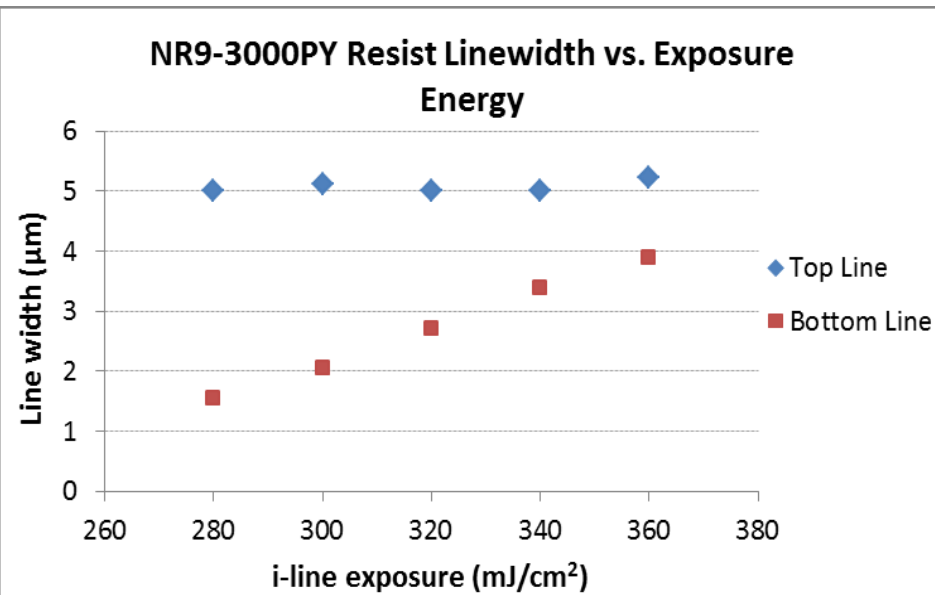
340mj



360mj

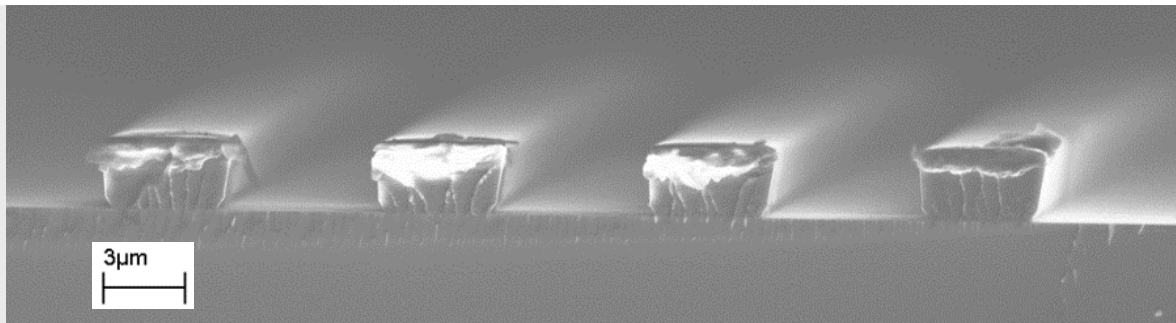
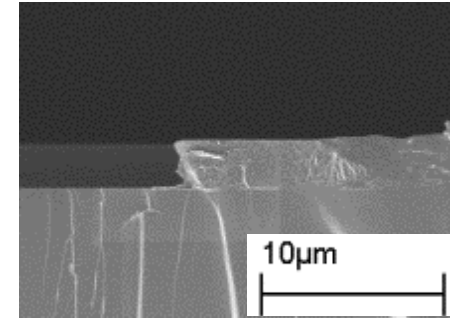
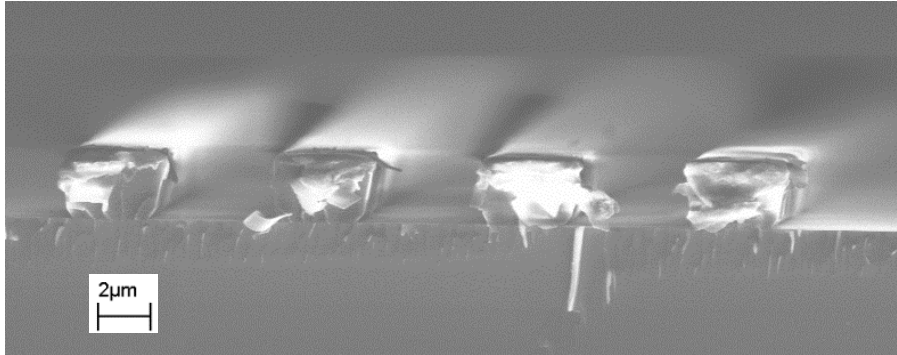
- Profiles of 3 μm thick NR9-3000PY lines as a function of exposure energy

NR9-3000PY - Superior Processing Window



- Plots of top & bottom linewidth dimensions and undercut angle as a function of exposure energy for 3 μm thick pattern of NR9-3000PY
- Note how top CD remains the same while bottom CD changes with exposure dose => broad processing window

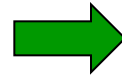
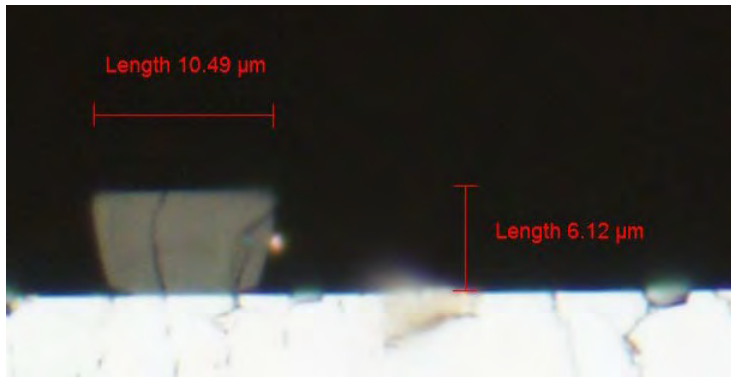
Single-Layer Lift-Off Process – Superior Heat Resistance



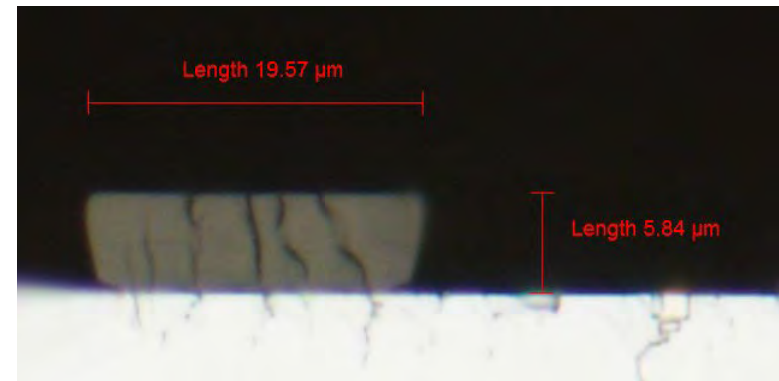
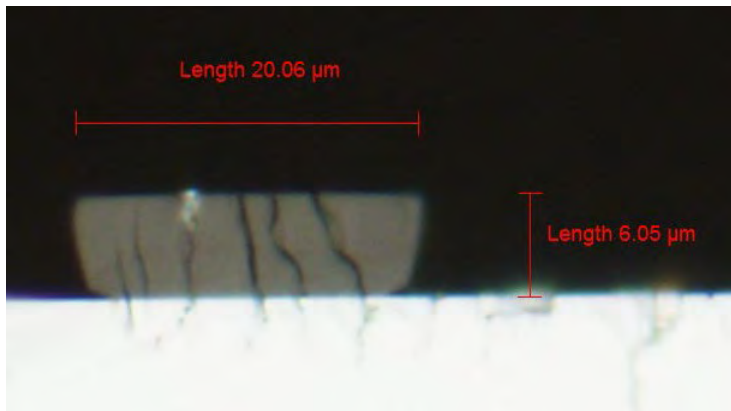
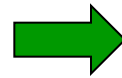
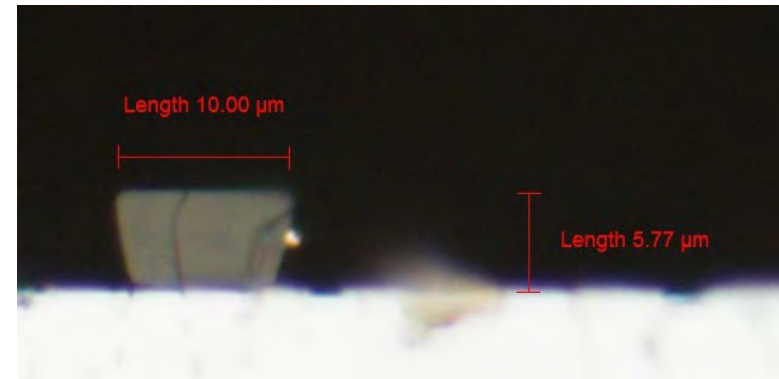
- SEMs show resist undercut profile present for 3 μm thick NR74g-3000PY after post-develop bake on a hotplate at 180°C for 2 hours
- Resist is easily stripped even when exposed to temperatures exceeding 250°C

Single-Layer Lift-Off Process – Superior Heat Resistance

After Development



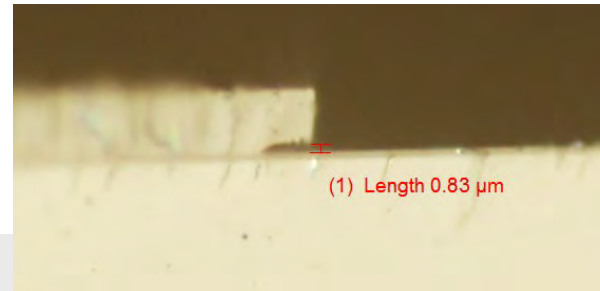
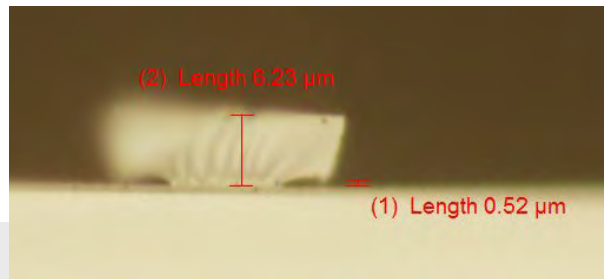
After Post-develop Bake



No change in resist profile is observed with 6 μm thick NR77-5000PY after 200°C hardbake for 5 hours (oven)

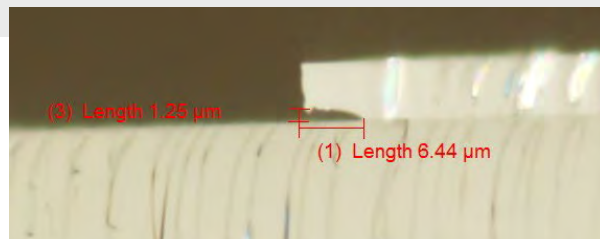
Single Layer Lift-off : Bottom Undercut

- Facilitates simple lift-off for conformal metal deposition tools
- Suitable with substrates of variable reflectivity
- Easy process tuning for undercut height

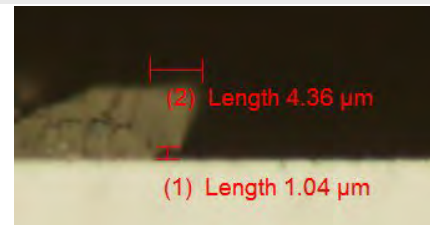
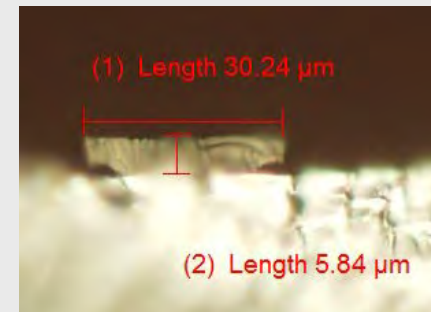


GaN

Glass



Silicon



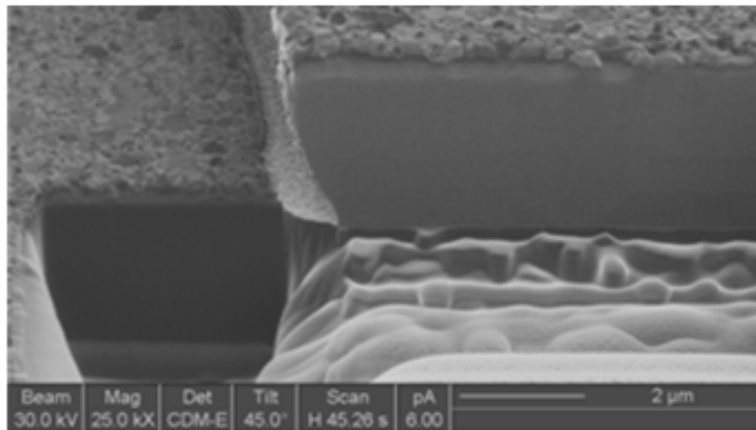
Single Layer Lift-off - NR3G-3000PY for g,h-line Stepper

- Negative Resist NR3G-3000PY Thin Film
 - Specifically created for one of the largest optical components manufacturers in the world
 - NO bi-layer lift-off required
 - NO HMDS steps required
 - NO dehydration steps required
 - NO hardbake steps required
 - NO associated cooling steps

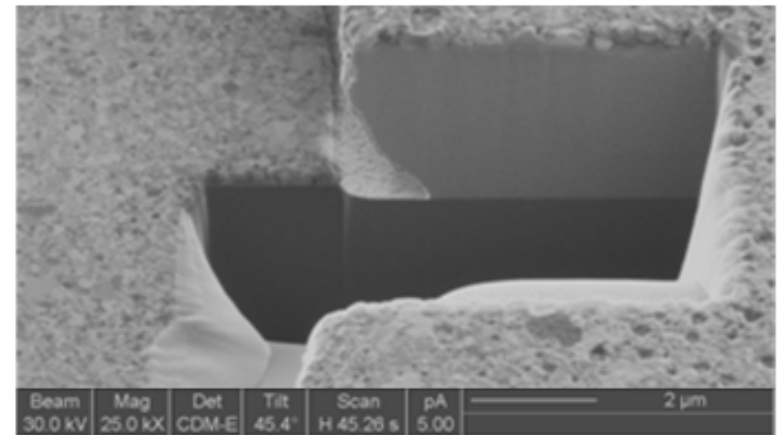
Technology Advantage Gives the Customer Immediate ROI

Exhibit A: Negative-sloping undercut profiles of 3um thick NR3G-3000PY on silicon

300mJ/cm² Exposure Dose*



250mJ/cm² Exposure Dose*



***Ultratech UT1500 g,h-line wafer stepper**

High Temperature NR Thin Films

- **Heat-resistant negative resists**

NR74G-1500P

NR74G-3000P

NR74G-6000P

NR5-17000S1

- **High Sensitivity
& Heat Resistance**

NR73G-3000P

NR73G-8000P

NR76G-8000P

NR78G-8000P

NR77-25000P

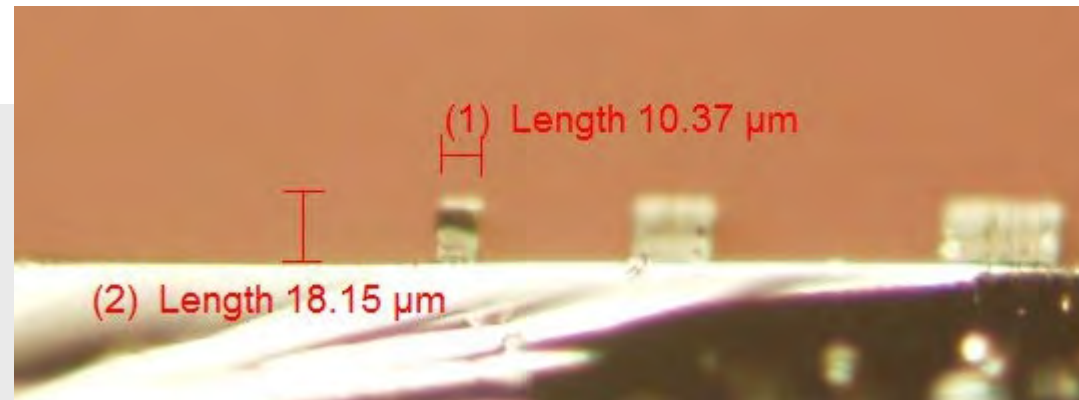
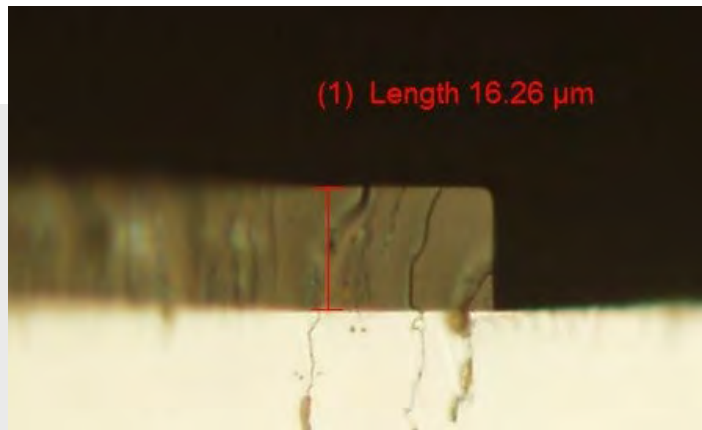
- **Excellent heat resistance up to 250°C**

- **Applications**

- Formation of permanent components of device structure replacing polyimides
- Formation of components of microfluidic devices
- Formation of temporary structures to shape metals and dielectrics deposited in elevated temperatures on top of resist structures
- Dry etch mask with O₂ RIE removal (NR78G- series)

High Temperature NRs – Permanent Display Applications

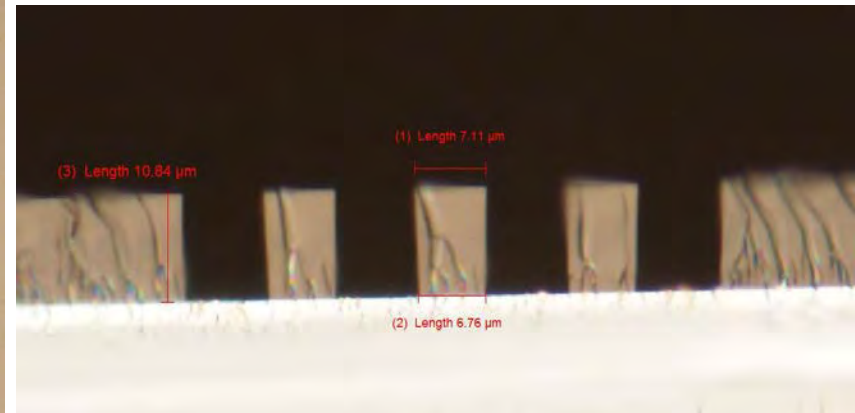
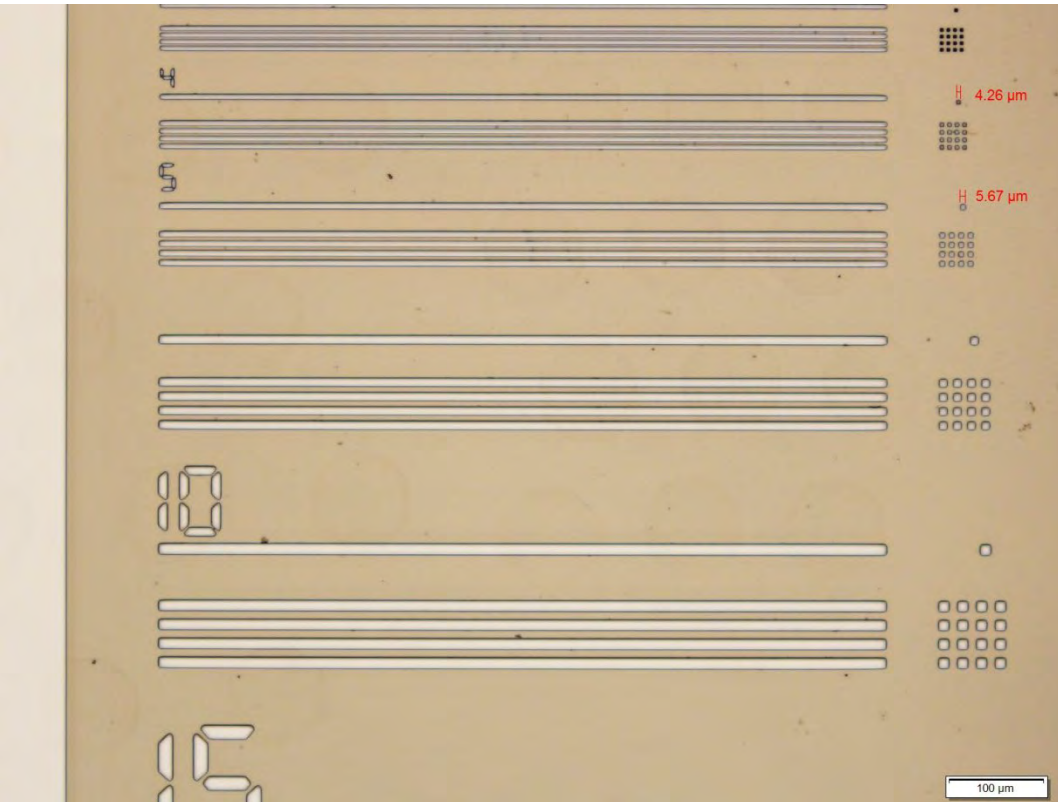
- Excellent heat resistance up to 250°C
- Transparent and permanent (excellent chemical resistance)



Images showing straight profile of 16-18 μm thick pattern of NR76G-8000P after post-development bake at 230°C.

High Temperature NRs - Dry Etch Mask with O₂ RIE Removal

- Excellent heat resistance up to 250°C
- Superior selectivity in dry etch processes
- Superb resolution capability
- Complete removal in O₂ RIE (no need for wet stripping)



Images showing resolution capability & straight profile of 11 µm thick pattern of NR78G-8000P after development

Ultra-Thick Negative Resists

- Thick Negative Resists

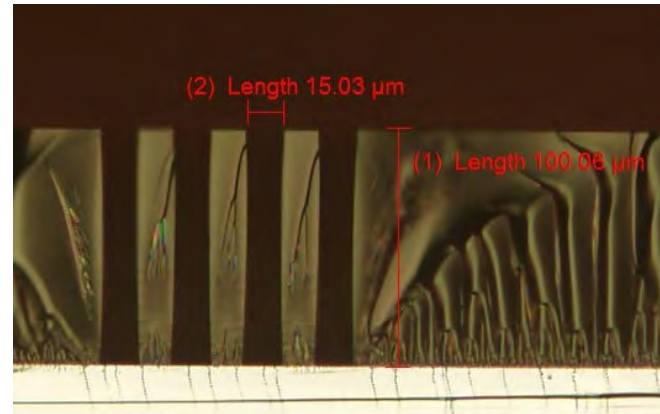
NR26-12000P

NR26-25000P

NR26-40000P

NR28-25000P

NR29-25000P



Cross-section of 100 μm thick pattern of NR26-25000P after development. Aspect ratio exceeds 6:1 with lines/spaces.

- Capable of forming uniform films up to 250 μm with single spin coating

- Superior resolution with straight sidewalls (NR26-series)

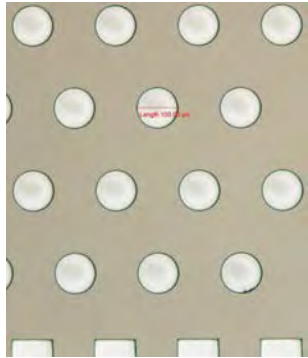
- >5:1 aspect ratio (lines/spaces configuration)
- >3:1 aspect ratio (vias)

- Applications

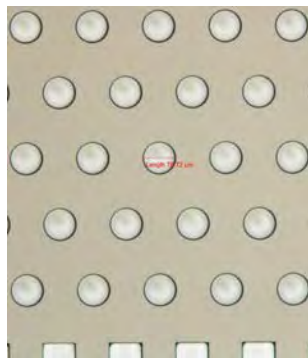
- Formation of masks in plating – NR26-series
- WLP & bump formation (packaging) - NR26-series
- Selective planarization of deep trenches – NR28-series
- Formation of retention walls for applying phosphors at wafer-level in fabrication of HBLED devices – NR29-series

Resolution Images for >230 μm thick film of NR26-40000P

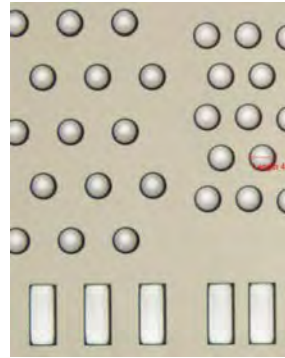
Contact Vias



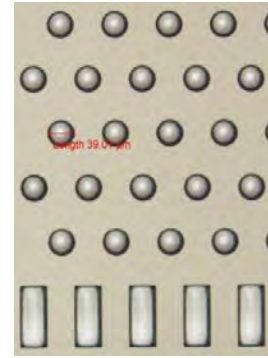
100 μm



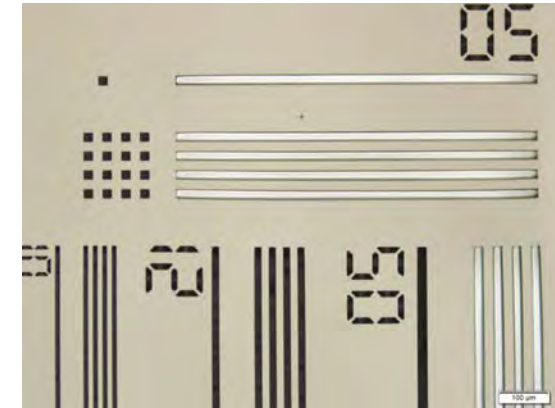
80 μm



50 μm



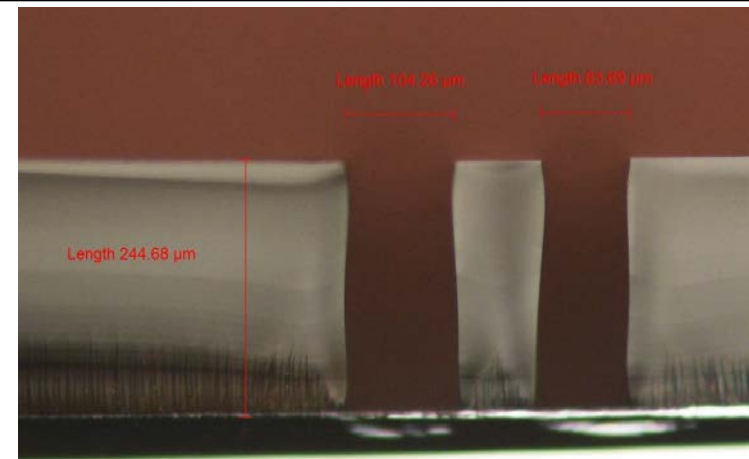
40 μm



20 μm lines/spaces

Process conditions

- Substrate: bare Si
- Spin coating: 800 rpm/15s (static dispense)
- Softbake (hotplate): 150°C/1800 s
- I-line exposure dose: 2500 mJ/cm²
- Post-exposure bake (hotplate): 100°C/240s
- RD8 puddle development
- >6:1 aspect ratio achieved (contact vias)
- >10:1 aspect ratio achieved (L/S configuration)



Cross-section of 80 & 100 μm
wide spaces

Hydrophobic Resists

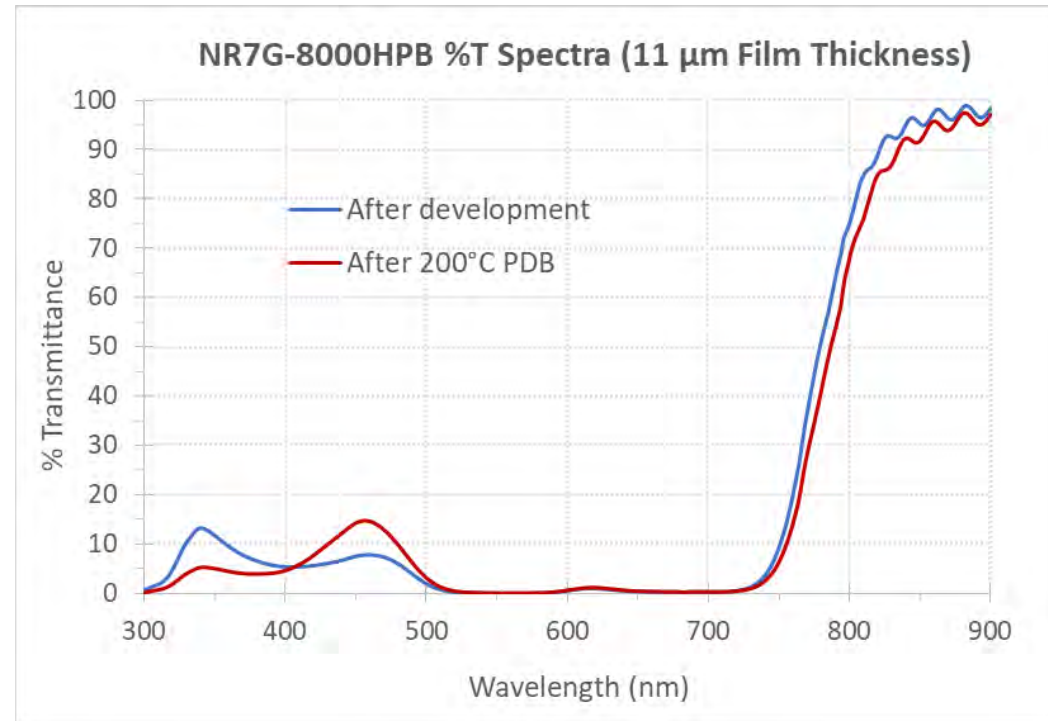
- Hydrophobic resists
 - NR75-1000HP
 - NR75-8000HP
 - NR75G-1500HP (g-line)
 - NR75G-8000HP (g-line)
- Chemically amplified negative resist which exhibits **hydrophobic surface after patterning and post-develop bake at 200°C**
- Exhibits excellent adhesion, chemical resistance, and temperature resistance
- Applicable as pattern to facilitate inkjet printing of phosphors for OLEDs

Duration of UV Ozone treatment (s)	Contact Angle Before UVO	Contact Angle After UVO
20	55	57
40	54	57
60	58	63
120	56	61

Tabulated contact angles between methyl benzoate and surface of 1.4 μm thick film of NR75-1000P after patterning and curing at 200°C

Black Hydrophobic Negative Resists

- Designed to give photo-patternable black, permanent, and hydrophobic mask
- Excellent solvent resistance after post-develop bake at 175°C (or higher) for 2 min on hotplate
- Superb adhesion (NO HMDS)
- Sensitive to 350-450 nm exposure wavelengths
- Straight resist sidewalls with temperature resistance exceeding 250°C
- Comparable contact angles to those in table on previous slide
- **Primary application is to improve pixel contrast in display/OLED applications**



Negative Aqueous Resists

- Negative Aqueous Resists

NAR1-100

NAR1-500

NAR1-1000

- Aqueous-based, non-chemically amplified, negative tone photoresists

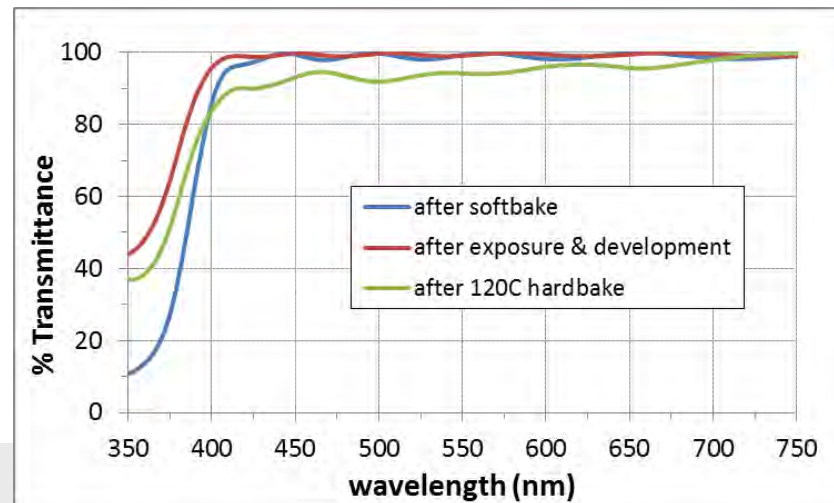
- Developed in water

- Sensitive to wavelengths shorter than 400 nm

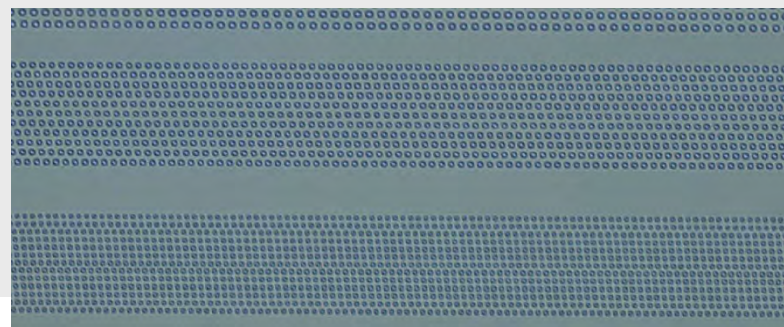
- Excellent adhesion, flexibility, transparency, chemical & temperature resistance up to 200°C

- Applications

- Permanent pattern in electronics for wearable devices
- Protective coating/passivation layer
- Alternative to SU-8 in thin film application



%T spectra for NAR1-1000 at various stages of processing



Optical Microscope image of positive resist patterned on top of NAR1-100

Positive Photoresists

- Positive Photo Resists

PR1-70A1

PR1-100A1

PR1-200A1

PR1-1000A1

PR1-2000A1

PR1-4000A1

PR1-9000A1

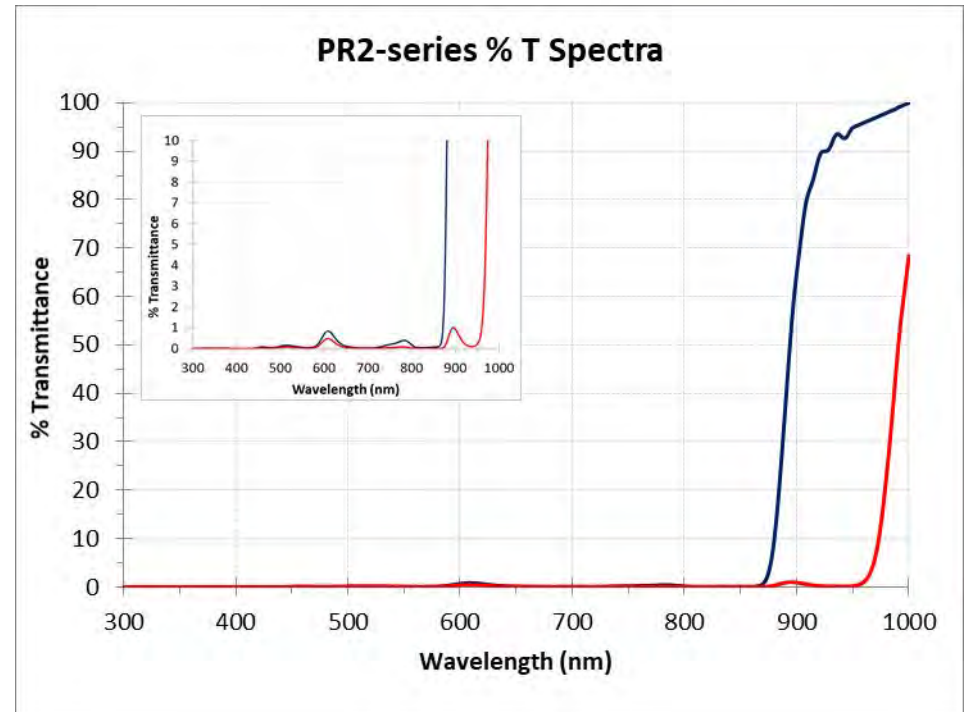
PR1-12000A1

- Enhanced adhesion positive resists for dry/wet etching, plating or ion implant
 - NO HMDS required
 - Ultra-fast resists for i-line, g-line & broadband exposure tools
 - Temperature resistance < 130°C

- Residue-free Development
 - NO ashing steps required after development
 - Increases processing throughput
 - Saves capital equipment cost

Black Positive Photoresists

- Capable of blocking 99%+ of light in wavelength range of 300 - 950 nm
- Film thicknesses up to 18 μm
- Superb adhesion (NO HMDS) on a variety of substrates
- Sensitive to 350-450 nm exposure wavelengths
- Superb resolution capability: >3:1 aspect ratio for resist vias with straight sidewalls
- Designed to be a black, permanent patternable layer for optical devices

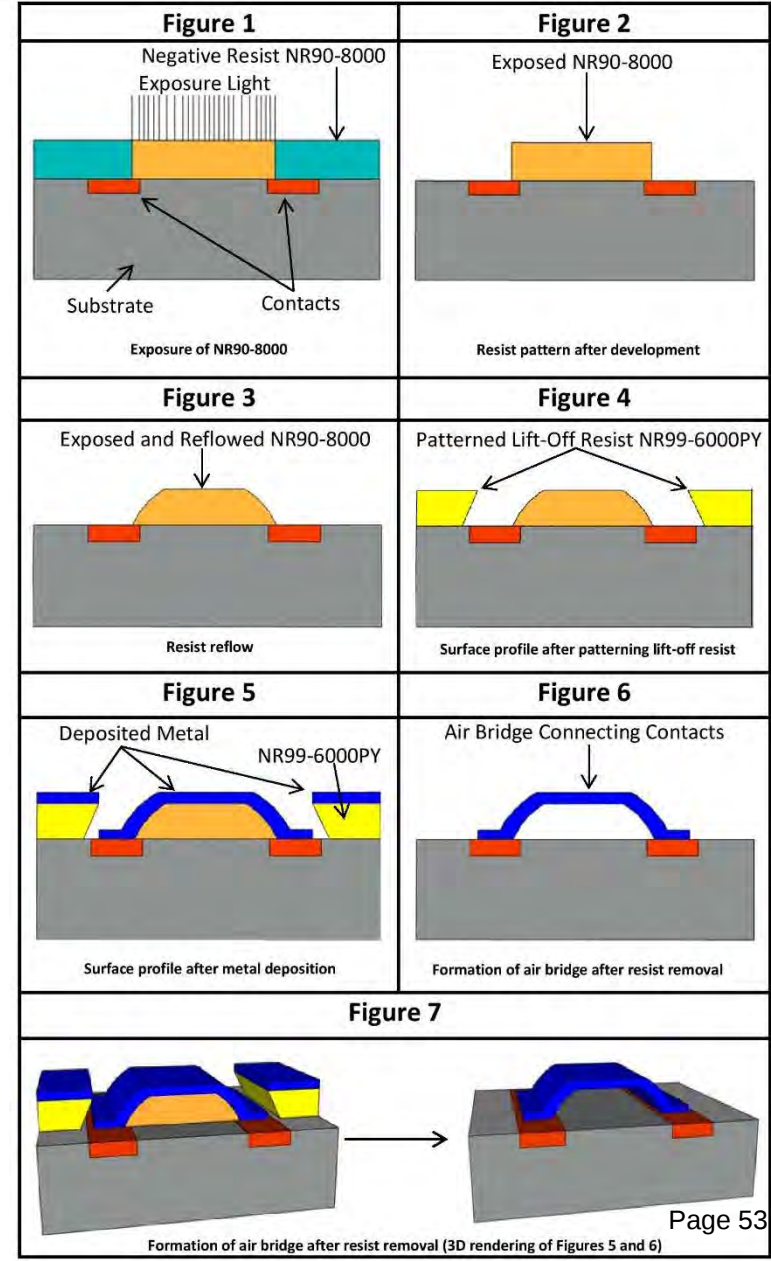


3 μm vias cleanly resolved (10 μm thick film)

- Breakthrough process **eliminates need for expensive permanent spin-on dielectrics** in MEMS, packaging ICs, and AMOLED displays
- Permanent dielectrics may swell due to moisture or solvent absorption
- This leads to cracking of metal interconnects or lifting metal pads from contacts
- Key advantages of the Air Bridge Process are:
 - Reduction of process steps, which enhances device yields and lowers production costs
 - Reduction of parasitic capacitance, which boosts device speed
 - Elimination of device long-term reliability concerns related to dielectric layer

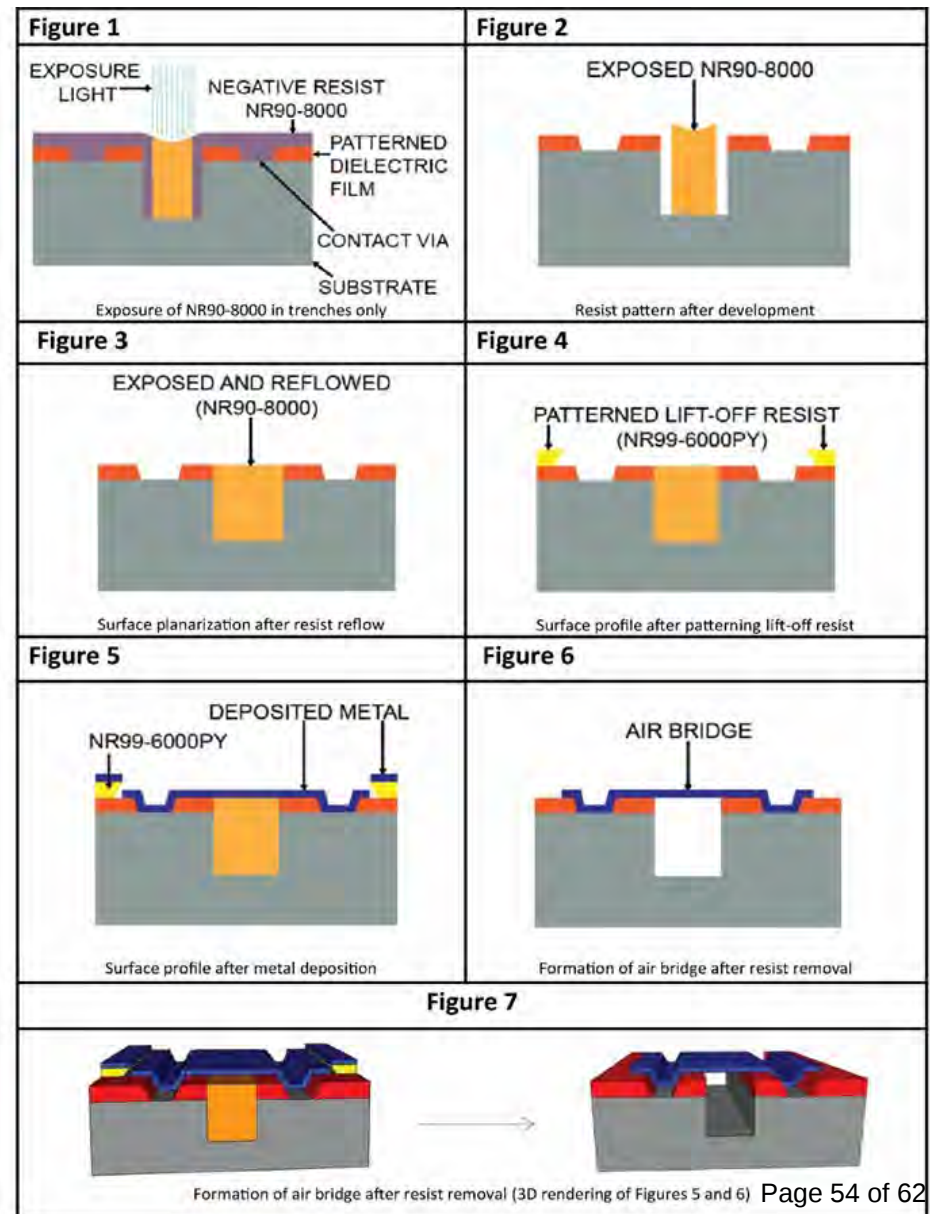
Air Bridge Interconnection Process

- Simple, elegant process
- NR90-8000 provides structure to the air bridge
- NR99-6000PY facilitates lift-off process of interconnecting metal
- Resists are easily dissolved/stripped after metal deposition



Air Bridge Process – Surface Planarization

- Facilitates the ability to planarize device surface through reflow of resist in trenches & selective metal deposition

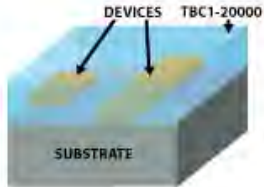
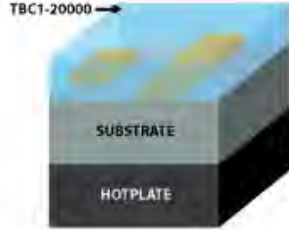
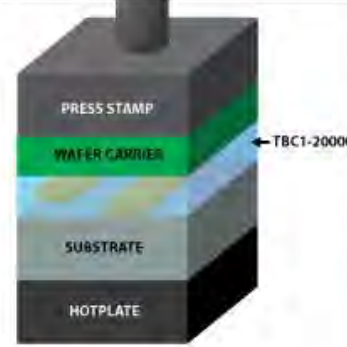
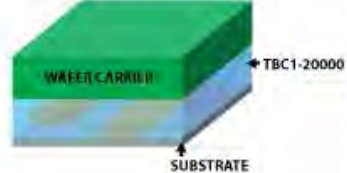
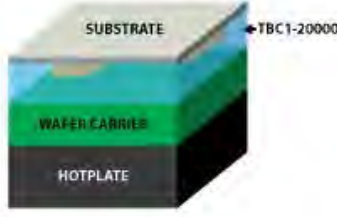
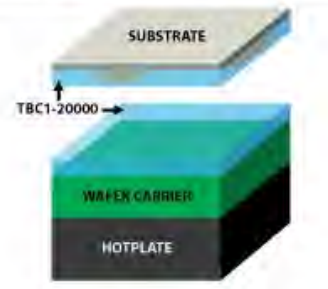
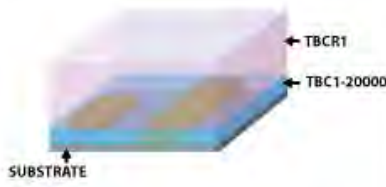
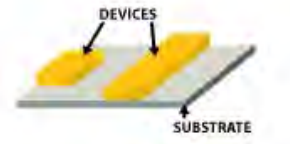


Non-lithographic Thin Films

- Wide variety of non-lithographic thin films offered, including:
 - Planarizing Coatings for planarization and etchback (PC3-series)
 - Protective Coatings for dicing and/or wet etching (PBC4-series)
 - No chipping or peel-off during dicing
 - Easily removed with resist developer or polar solvents
 - Protective Barrier Films up to 100 μm thick for protection of bumps (PBC7-series) during backpolishing (wafer thinning)
 - Easily stripped in common photoresist strippers even after exposure to 180°C
 - Temporary Bonding Film for temporary bond between wafer carrier and device wafer (TBC1- series)
 - Facilitates wafer thinning by polishing, wafer dicing, and/or photo-patterning the backside of device wafer followed by etching or plating
 - Debond is easily accomplished by lifting device wafer away from wafer carrier after heating above >180°C
 - No custom equipment required
 - After debond, TBC1 is easily stripped in common solvents

Temporary Bond Film

- Simple bonding & debonding process
- Thinner varieties available ($\geq 6 \mu\text{m}$ thicknesses)

Figure 1  TBC1-20000 application on device side of substrate	Figure 2  Softbake on a hotplate at 130°C for 180 s	Figure 3  While still on 130°C hotplate, bond wafer carrier to TBC1-20000 coated device wafer using a press stamp	Figure 4  Substrate thinning by polishing (or other desired process steps on backside of device substrate)
Figure 5  Rotate substrate and wafer carrier stack 180° (device substrate now on top) and bake on a hotplate at 190°C for 45 s*	Figure 6  While still on hotplate at 190°C, separate thinned substrate from wafer carrier with tweezers or beveled edge tool	Figure 7  Removal of remaining film of TBC1-20000 with TBCR1 by puddle process	Figure 8  Substrate with devices after removal of remaining TBC1-20000 with TBCR1

*Note: Actual duration of bake on hotplate at 190°C may need to be adjusted depending on thermal conductivity of the substrate and wafer carrier

Non-lithographic Coatings, cntd.

- Spin-on Glasses for use as dielectric in permanent or partial etchback mode (IC1-series)
 - Futurrex pioneered polysiloxane based spin-on glass
 - Also applicable as bonding medium for phosphors in LED fabrication
 - Relatively low dielectric constant
 - Thickness up to 10 μm obtainable
- Dielectric Coatings to form hard glass films on device surface (DC4-series)
- Spin-on- and silkscreen-applied dopant sources for photovoltaic applications
 - B- and P-dopant coatings
 - Facilitation of maximum theoretical concentration of dopant in substrate
 - Lower cost alternative to traditional, capital intensive ion implant methods
- Spin-on Zn-dopant coatings for InP and GaAs substrates

Auxiliary Formulas: Edge Bead Removers

- Applications
 - Removal of resist from top and bottom edge of coated substrate
 - Planarization of ultra-thick coatings during single spin dry cycle
- Properties
 - Liquid solvent
- Impact on productivity
 - Elimination of contamination source to wafer handling equipment
 - Elimination of particle shedding source

Edge Bead Removers	
For Positive Resists: EBR1	For Negative Resists: EBR2, EBR3

Auxiliary Formulas: Resist Developers

- Applications
 - Development of resist pattern
 - Removal of Futurrex temporary adhesive, protective, and planarization coatings

- Properties
 - Water based, basic solution

- Impact on productivity
 - Application of single developer for both positive and negative resists
 - Elimination of solvents in removal of PC3 films
 - RD2, RD6 & RD8 include surfactants which provide superior resolution and cleaner development versus industry standard 2.38% TMAH in water

Resist Developers	
Alkaline metal containing: RD3	TMAH containing: RD2, RD5, RD6, RD8

Auxiliary Formulas: Resist Removers

- Applications
 - Removal of resist pattern after completion of processing

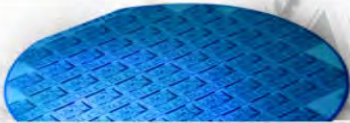
- Properties
 - Liquid

- Impact on productivity
 - Reduction of time to remove resist

Resist Removers		
Solvent-based Solution: RR6	Ester-based solution: RR5	DMSO-based solution: RR2, RR4, RR41



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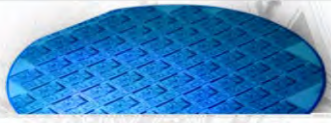
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- Markets
- Products
- Applications**
- History
- Request For Information
- Contact

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- Analog Semiconductors
- Light-Emitting Diodes [LEDs]
- MEMS
- Solar PV
- Microfluidics & Biochips
- Optoelectronics / Photonics
- Packaging
- Adhesion, Protection, Planarization
- Graphic Arts

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