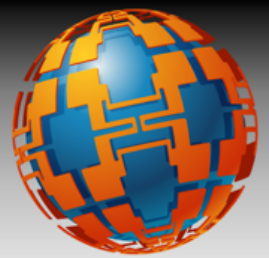
MNT[e]SIG LIVE! 2021 VIRTUAL CONFERENCE

NSF

HANDS-ON PROFESSIONAL DEVELOPMENT AT UNM WITH YOUR STUDENTS

Matthias Pleil; Ph.D.
PI - SCME



SCME

Support Center for Microsystems Education

OVERVIEW

Who Is SCME?

What we do?

URE – a new opportunity for you and with your students

Other Opportunities to consider

SCME

WHAT WE DO

- Educational Materials
  - Downloadable from SCME-Support. Org
  - Asynchronous online Short Courses at SCME.online
  - Hands-on Kits upon request

PROFESSIONAL DEVELOPMENT & OUTREACH

- Support Faculty Professional Development with Cleanroom 1-week Pressure Sensor workshops.
- Conference workshops, webinars and one-to-one activities
- Fab tours, RAIN Sessions, speaking at STEM events
- Online asynchronous courses

MNTeSIG
MICRO NANO TECHNOLOGY
education
SPECIAL INTEREST GROUP

MNTESIG COMMUNITY

Online meetings
Annual Conference
Website: MNTeSIG.net
Industry Map Project

NEW OPPORTUNITY

Professional Development

+

URE Students

=

New Opportunity

SCME URE - UNDERGRADUATE RESEARCH EXPERIENCE

Targeting community college **technician students AND their instructors!**

Primary Partners:

- Pasadena City College - Jared Ashcroft
- Ivy Tech – Caitlin Cramer, Andrew Bell
- Rio Salado – Rick Vaughn
- Lone Star College – Danny Kainer, Pamela Auburn

Open to ALL Tech Faculty and Students!

THIS YEAR

- 22 **community college** student and educator participants in summer 2021
  - 14 students, 8 faculty
  - 4 Institutions: Pasadena City College, Rio Salado College, Ivy Tech, Southern University Shreveport
- 1 week each for three groups
- Stipends for both students and faculty

URE STRUCTURE

Recruit Community College Technical Education Faculty and Students - Fall

Remote Research Preparation – Fall/Spring

Online short courses for students & faculty – Fall/Spring

Summer Experience: University of New Mexico MTTC Cleanroom

MANY TOPICS TO CHOOSE FROM

- Fabrication Process Characterization
  - Lithography
  - Wet and Dry Etch
  - Deposition – Sputter, Evaporation, CVD
- Electrical Characterization
- MEMS Design Principals
- Device Applications

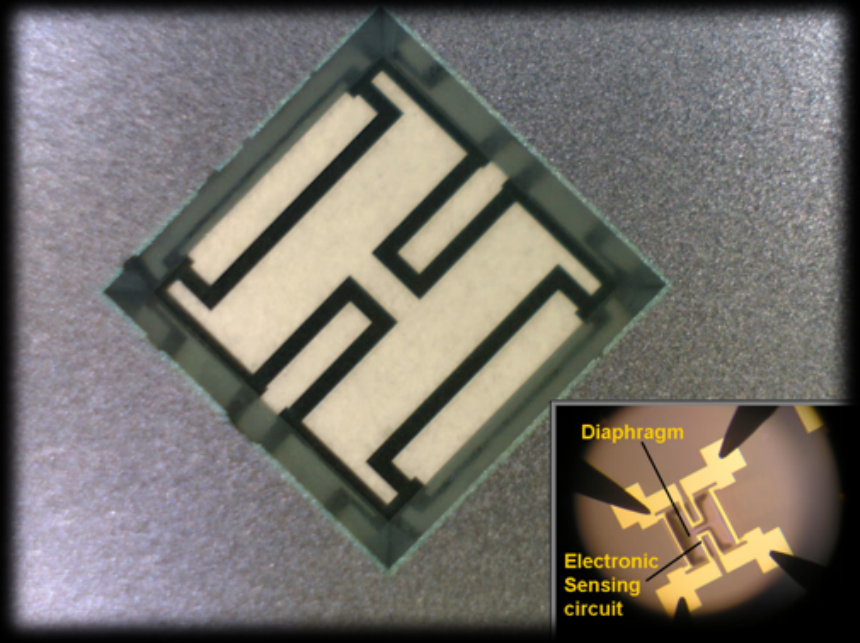
- BioMEMS
  - Microfluidics and microneedles
- Flexible Electronics
- Modeling
  - Cantilever
  - Pressure Sensor
- Metrology
- Micro/Nano/Bio - DNA

Work shoulder to shoulder with professors and graduate students!

ART WAFER: BASIC PHOTOLITHOGRAPHY AND WET ETCHING HANDS-ON EXPERIENCE

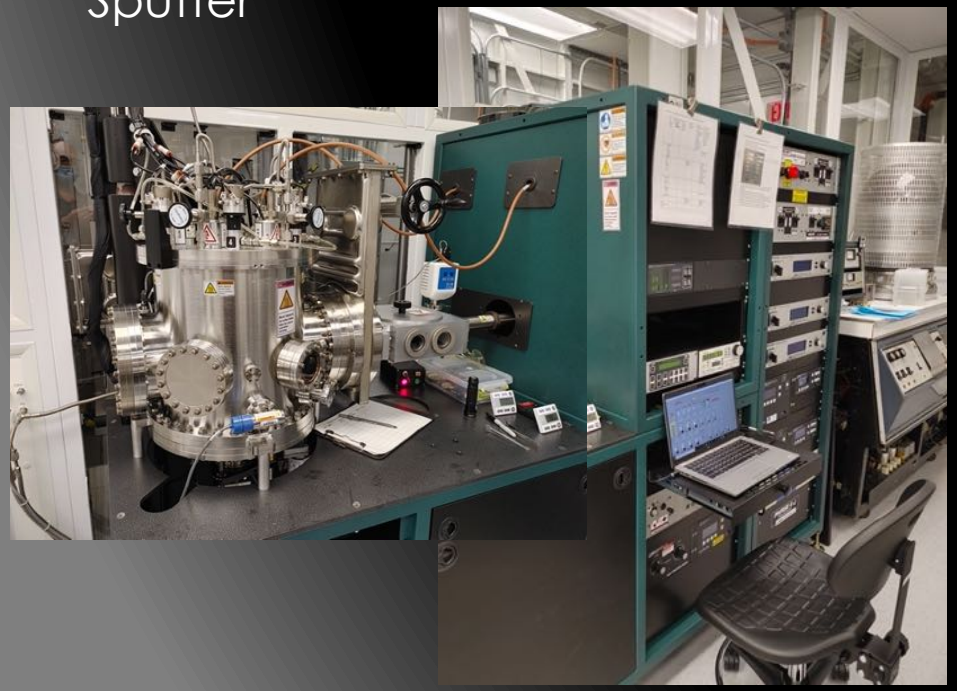
PRESSURE SENSOR PROCESS:

1 WEEK CLEANROOM EXPERIENCE, SIMPLE TWO – MASK LAYER PROCESS, BACKSIDE (CHAMBER) PATTERN, SIN ETCH (DRIE), FRONTSIDE (WHEATSTONE BRIDGE) PATTERN, SPUTTER DEPOSITION, LIFTOFF, KOH ANISOTROPIC ETCH, CHARACTERIZATION

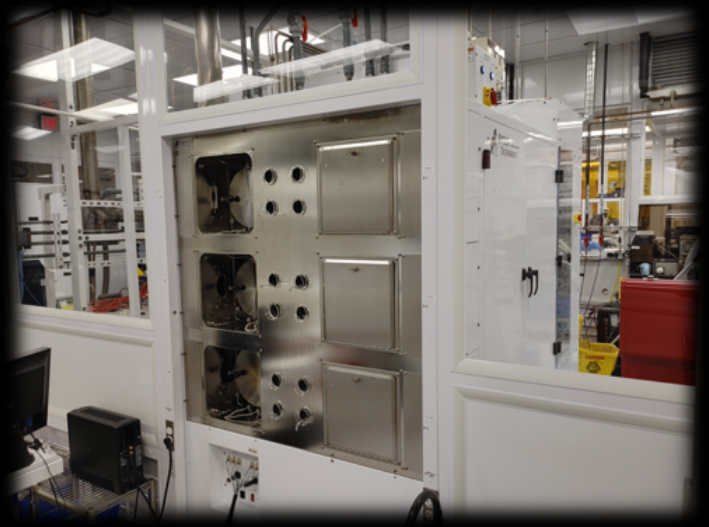


DEPOSITION

Sputter



Parylene

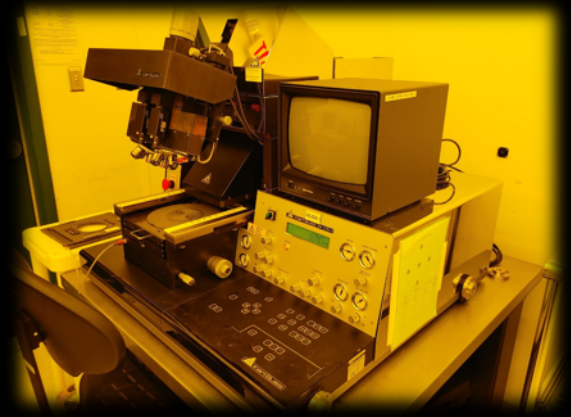


Oxide

LITHOGRAPHY

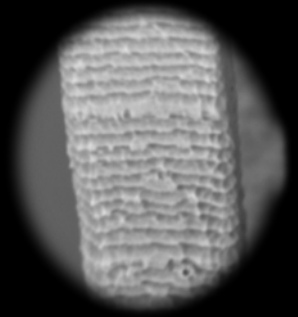
Coat

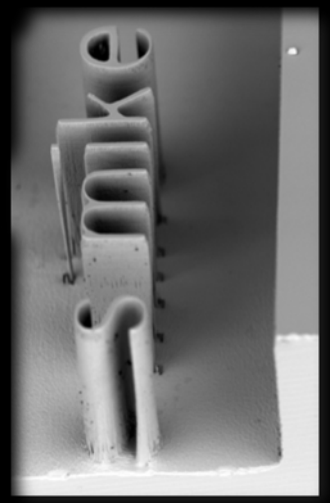
Expose



Develop

Spin Rinse Dry





ETCHING

March Reactive Ion Etcher

Alcatel Deep Reactive Ion Etcher

WHAT WE DID THIS SUMMER

Field Trip to HT Micro (Thanks Todd!)

Standard Fabrication Baseline

- Art Wafer
- Pressure Sensor Process
- Microneedles and Micro Fluidics

Characterization

- Isotropic BOE Wet Etching

Equipment Function and Operation

- Deep Dive – Contact Printer install
- HMDS Vapor Prime
- Coater
- Exposure tool
- Develop station – QDR, SRD
- RIE Etch
- AJA Sputter
- Nanospec- TF Measurement
- Optical Microscopes

NEXT YEAR – 2 WEEK OPPORTUNITIES! COME TO ONE OR TWO

Week 1

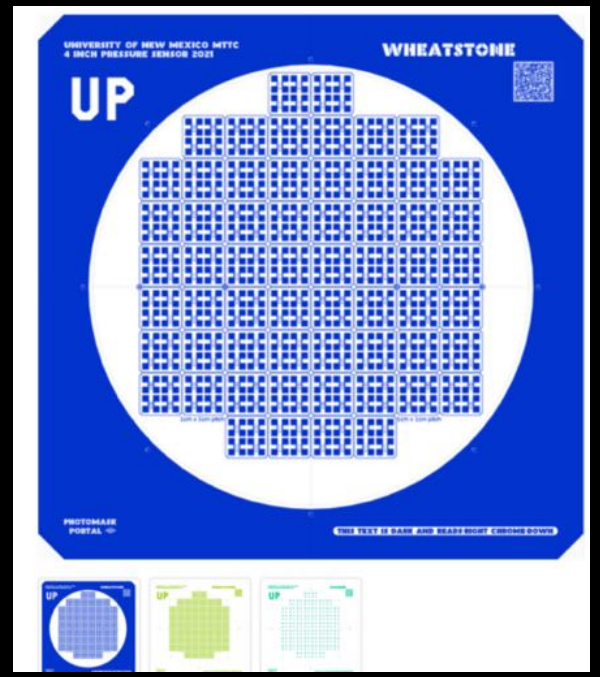
- Art Wafer
- Pressure Sensor
- Micro Needles
- Micro Fluidics

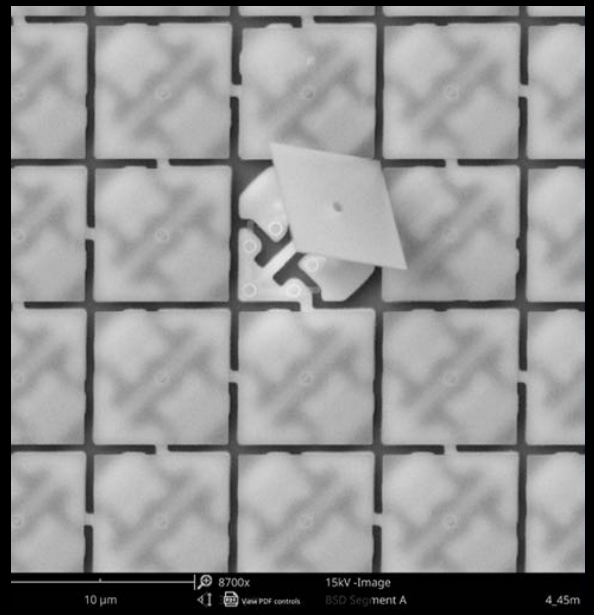
Week 2 - for returning students and continuing Week 1 students

- Focused – Characterization,
- Process optimization, new applications
- BioMEMS

More on Design

- MEMS design – Coventor Ware





More on Characterization

SEM

- CD's, EDS, Surface Roughness

NEXT STEPS

- Reach out to Dr. Pleil – mpleil@unm.edu
- Negotiate which weeks work for you and your students and discuss key areas that may be of interest.
- Review the online short course offerings - https://scme.online
- Collaborate on the online course requirements for the students

- Stipends available for students and faculty – varies on commitment.

ADDITIONAL OPPORTUNITIES GET INVOLVED!

- MNTeSIG – Micro Nano Technology Education Special Interest Group

Our Mission
Foster collaboration between educators at all levels, industry, and agencies for relentless improvement of the micro and nano technology workforce.

www.MNTeSIG.net

MNT^{e}SIG
MICRO NANO TECHNOLOGY
education
SPECIAL INTEREST GROUP

ACKNOWLEDGEMENTS

Dr. Nathan Jackson – UNM Prof. Of ME
Pallavi Sharma – Ph.D. Student UNM
Irma (Rocio) Vazquez – Ph.D. Student UNM

Dr. Matthias Pleil (Manager MTTC Cleanroom) and staff of MTTC is supported by the National Science Foundation under DUE Grant No. 1700678.

Feel free to reach out: mpleil@unm.edu

RESOURCES JUST A CLICK AWAY!

Key SCME Links:
Matt's email: Mpleil@unm.edu
SCME main website https://scme-support.org
Online short courses: https://scme.online
Join our collaboratory, the Micro Nano Education Special Interest Group: https://MNTeSIG.net

Key Parter Links

MNT-EC: https://micronanoeducation.org
NACK: https://nano4me.org
nanoHUB: https://nanohub.org/groups/scme

MNT^eSIG LIVE! 2021 VIRTUAL CONFERENCE

NSF

QUESTIONS?

mpleil@unm.edu

SCME

Support Center for Microsystems Education