Dual-Component Functionalized Allylated Calix[4]arene-Dibutyltin Diacrylate Blends as Organic-Inorganic Hybrid Resist Compositions for Nanolithography

SPIE.

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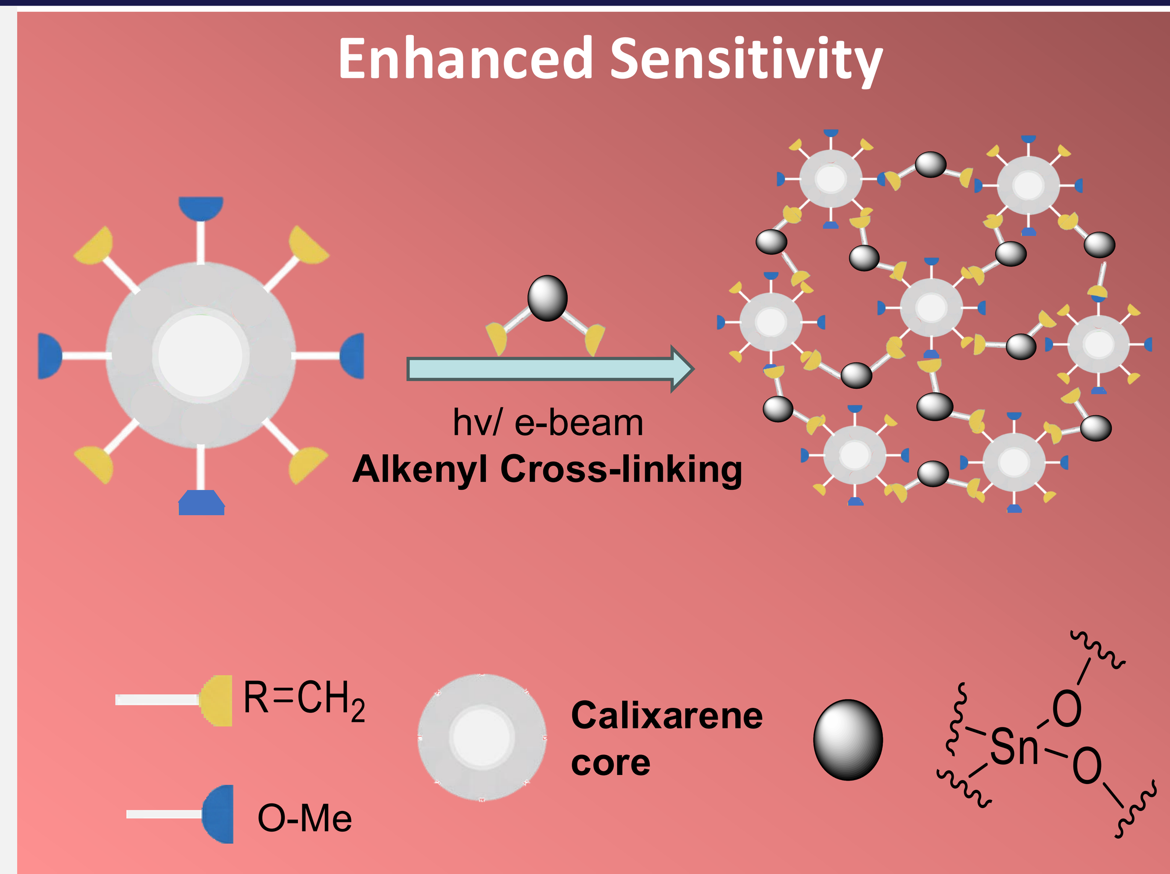
INTRODUCTION

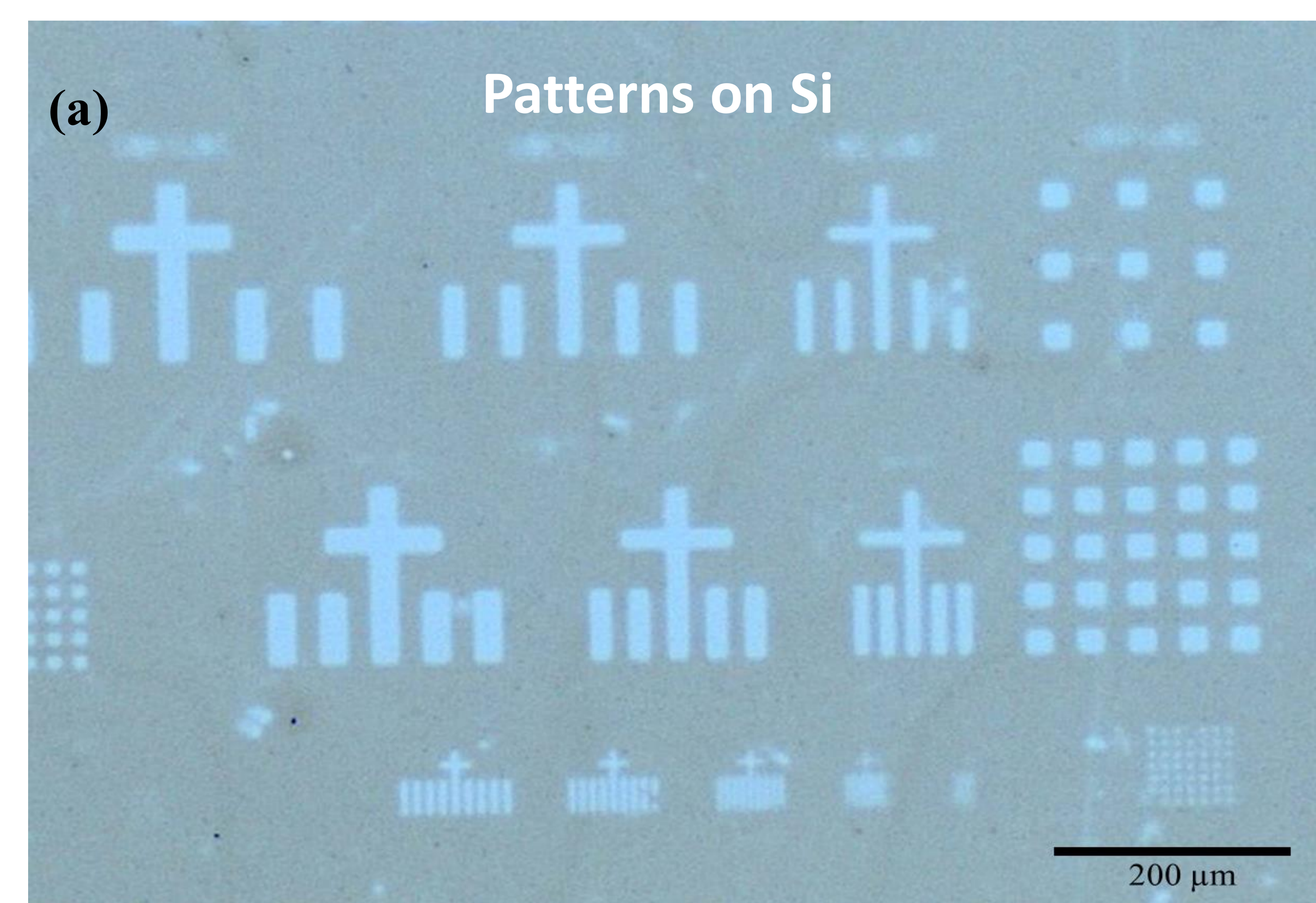
- Conventional organic resists face resolution limits, while inorganic systems suffer other challenges, such as low sensitivity & poor processibility.[1]
- Hybrid organic-inorganic systems[2] offer a promising platform to balance sensitivity, resolution, and thin film stability.
- In this work, we report a functionalised **calixarene-Sn diacrylate integrated resist** designed to enhance absorption and efficient crosslinking.

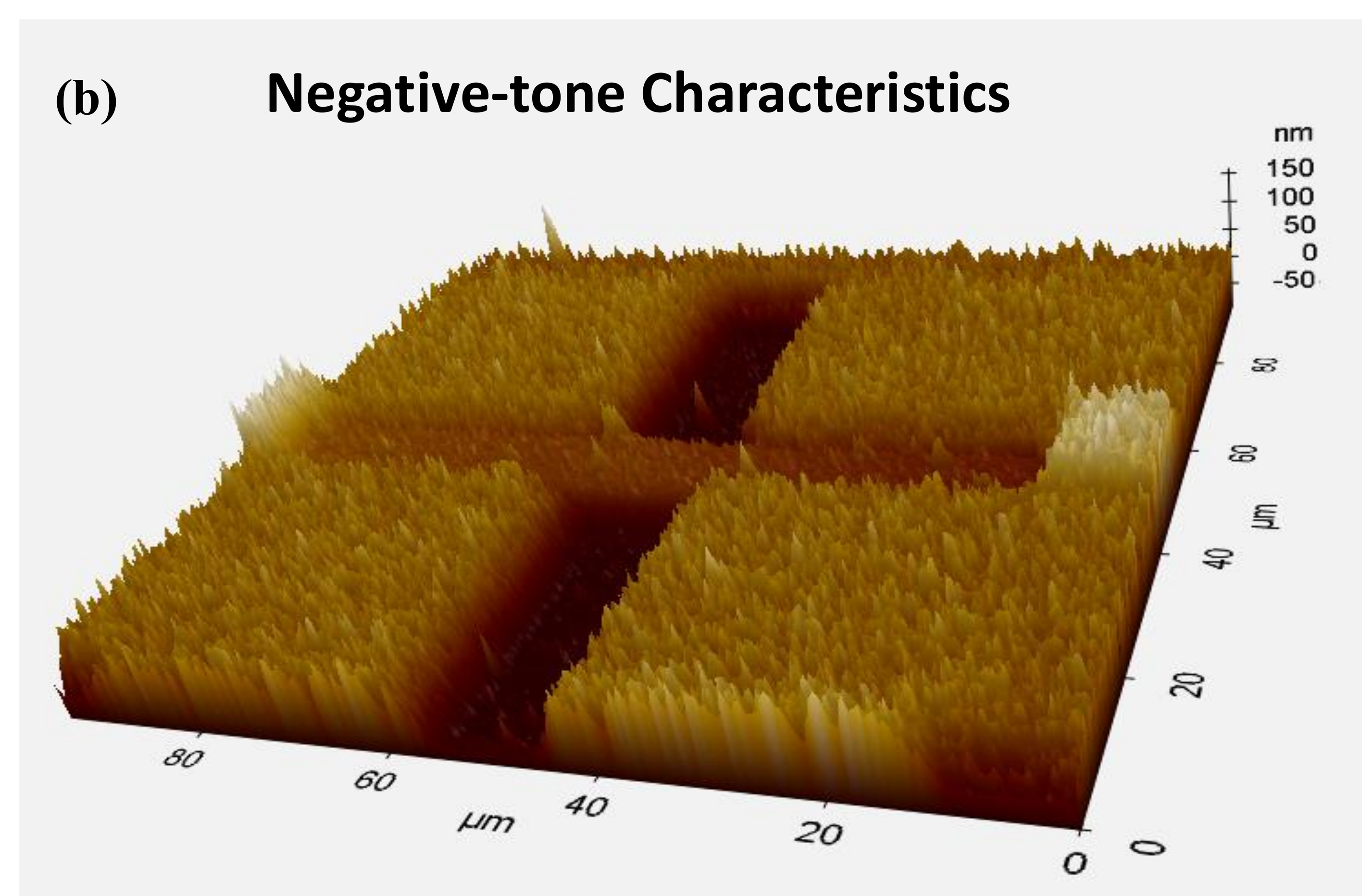


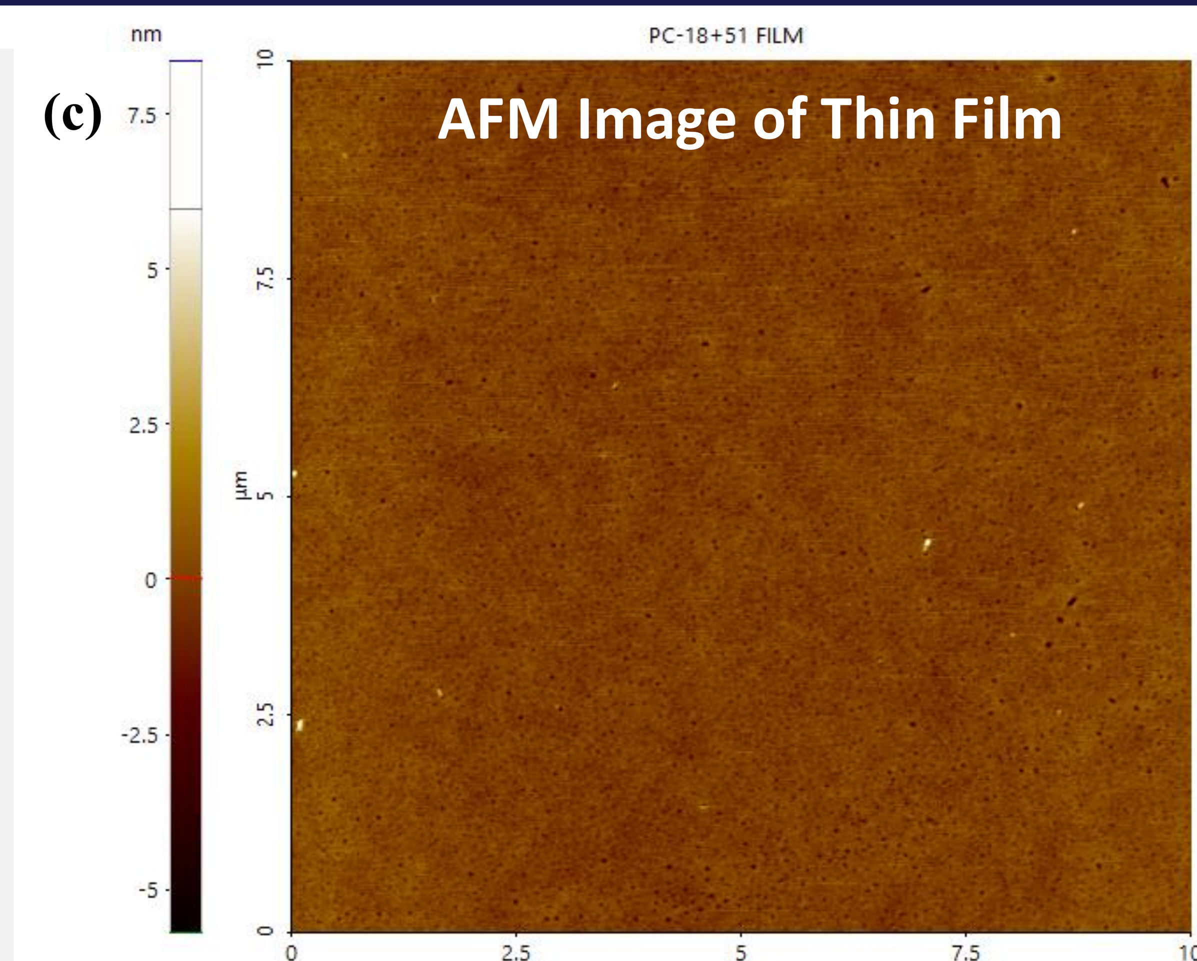
KEY-RESULTS

- Demonstrated **good film-forming capability**
- Successful **negative-tone DUV patterning**
- Hybrid Sn-calixarene architecture enables **enhanced sensitivity via crosslinking**
- Patterning sensitivity improvement to a larger extent over analogous systems.[3]

PHOTOLITHOGRAPHY AND THIN FILM STUDIES

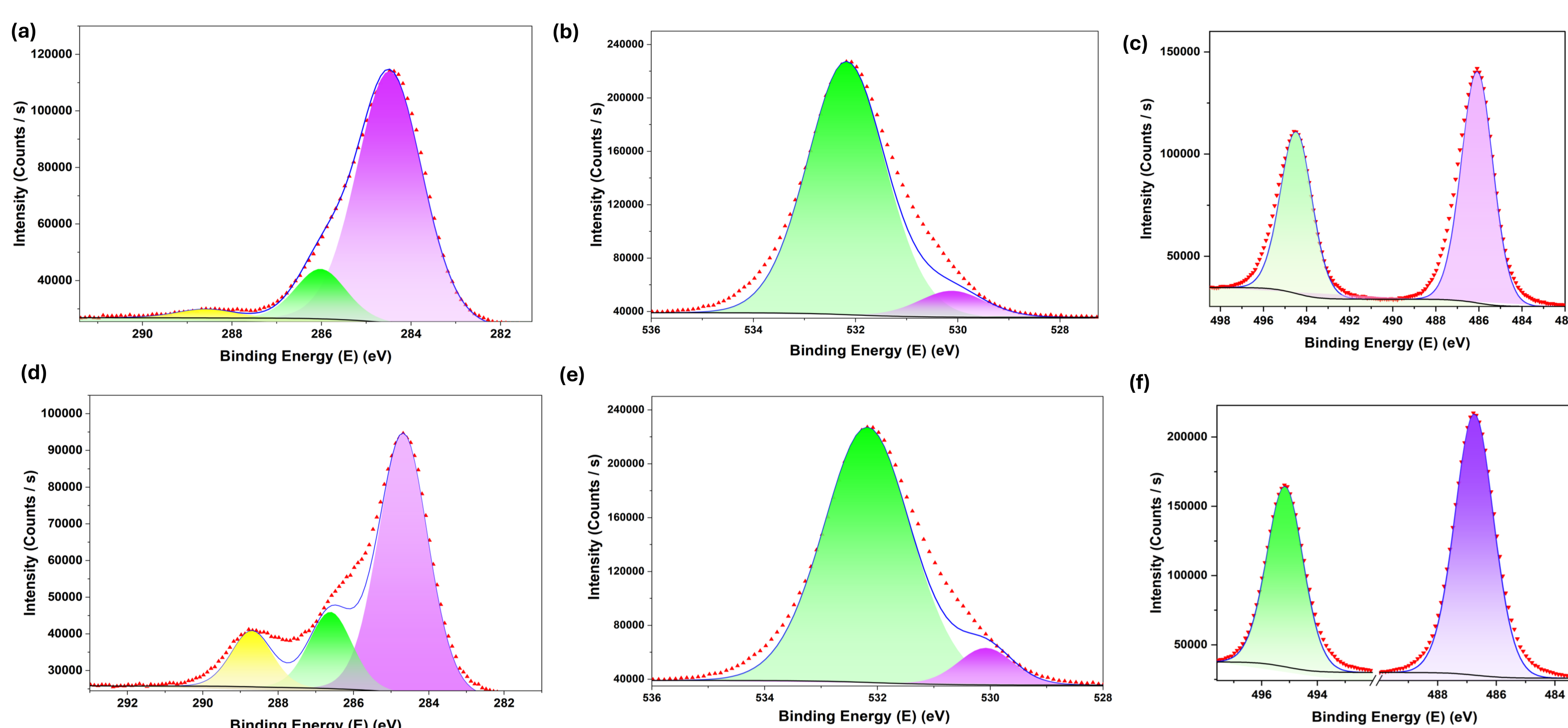






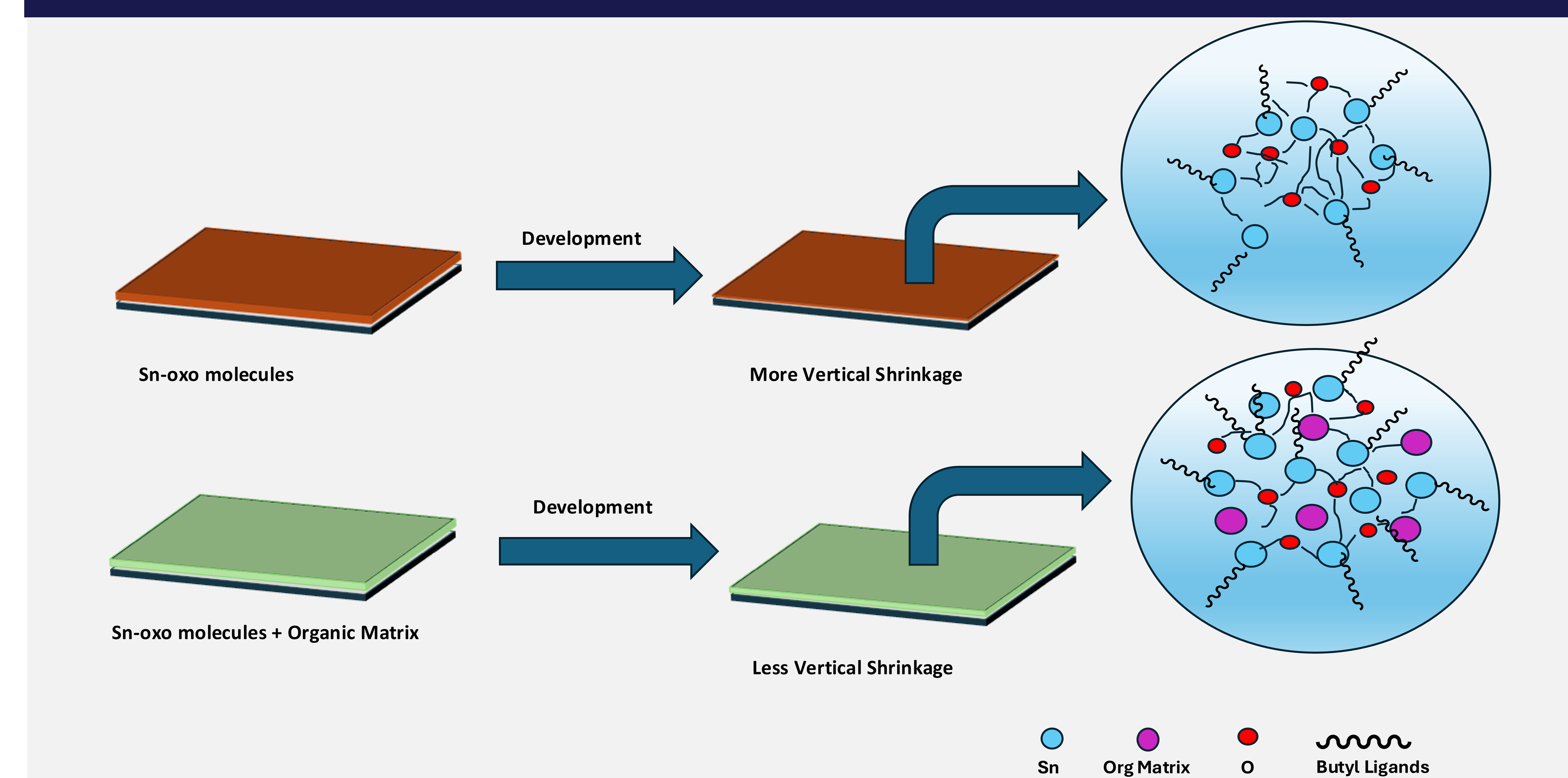
(a) Optical Microscope Image of Micron-sized features (b) AFM image of M6icron-sized cross features (c) AFM-Image of 10*10 µm² cross-section of Photoresist Film

XPS STUDIES



High Resolution XPS Data of CAlMe-DBTAc Films for C 1s, O 1s, and Sn 3d (a,b,c) before exposure and (d,e,f) after DUV exposure

VERTICAL SHRINKAGE CONTROL



CONCLUSION

- Demonstrated a **dual-component Sn-calixarene hybrid resist system**
- Achieved **good sensitivity improvement** over analogous systems
- Patterning through photolithography supported resist viability
- Platform shows promise for advanced nanopatterning applications.

ACKNOWLEDGEMENT

PC gratefully acknowledges **AMRC**, **IIT Mandi** for research facilities and the Ministry of Education, Government of India, for financial support through doctoral fellowship. PC also thanks **SPIE** for the opportunity to present this work at the Advanced Lithography + Patterning Conference.

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