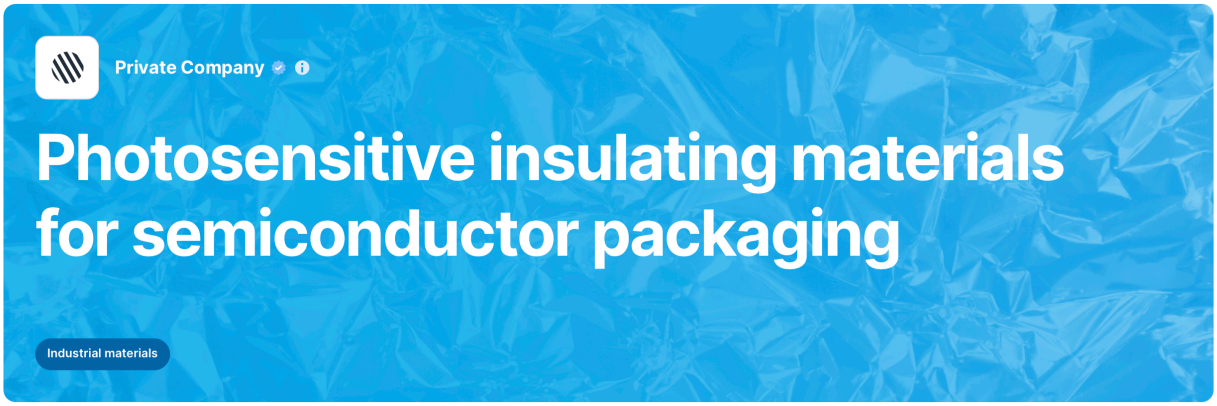

Background

We are a global leader in advanced materials, with expertise in high-performance polymers and electronic materials, driving innovation in the semiconductor industry. Photosensitive insulating materials are used as semiconductor packaging materials, specifically for the insulating layers of redistribution layers (RDLs) and solder resists. These materials enable the formation of fine wiring through photolithography using i-line exposure, ensuring insulation between circuits and maintaining reliability.
As semiconductor technology advances, particularly in RDL applications, there is an increasing demand for technologies that enable the formation of finer wiring and the development of materials that allow for simpler fabrication of such fine patterns. However, achieving this without significant investment in new equipment remains a challenge. Currently, photosensitive polyimides and polybenzoxazoles (PBOs) are widely used, but they are reaching their limits in enabling next-generation semiconductor designs. Therefore, there is a strong demand for photosensitive materials that provide enhanced, finer patterning capabilities while being compatible with existing equipment.

What we're looking for

We are looking for a novel photosensitive insulating material or a new method to induce photosensitivity to resin materials that goes beyond those currently used in industrial applications, specifically for semiconductor back-end processes. While polyimide is preferred, other resin types may also be acceptable. The ideal material should ensure semiconductor package reliability and minimize transmission loss by exhibiting low water absorption, high adhesion, low dielectric constant (Dk), and low dielectric loss (Df).

Solutions of interest include:

- Next-generation photosensitive polyimides
- New methods for imparting photosensitivity to polyimides
- Novel photosensitive high-heat-resistant resins beyond polyimides
- Advanced methods for imparting photosensitivity to high-heat-resistant resins

Our must-have requirements are:

- Photosensitive to i-line exposure wavelengths
- Enables patterning of line/space below 5 μm (L/S<10 μm acceptable) and via below 5 μm using i-line exposure

Our nice-to-have's are:

- Compatibility with semiconductor back-end processes, i.e., withstands soldering temperatures between 250 and 290°C with a resin glass transition temperature above 250°C
- Offers warpage control by achieving a low coefficient of thermal expansion (<40 ppm/K) and/or low modulus (<3 GPa)
- Aqueous developer is desirable; compatibility with an alkaline aqueous developer (e.g., TMAH aq.) is preferred, but organic developers (e.g., PGMEA and PEGME) are also acceptable

What's out of scope:

- Photoresist materials
- Processes or materials requiring hydrophobic solvents such as alkanes
- Solutions that require the use of hazardous solvents such as NMP and DMAc
- Restricted materials that do not comply with RoHS and REACH regulations
- Photosensitive systems with significant patent constraints used in existing redistribution layer (RDL) materials (e.g., negative-tone polyimide (PI) using a photo-acid generator (PAG) and acid crosslinking mechanism, unless it is differentiated from existing materials)

Acceptable technology readiness levels (TRL): Levels 3-6

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

- Sponsored research
- Co-development
- Licensing
- Material transfer

Benefits:

Sponsored Research

Up to 50,000 USD for a proof-of-concept study to demonstrate industrial relevance.

Facilities and Services

Access to a leading research and innovation hub in nanoelectronics and digital technologies for validation, provided the technology demonstrates industrial relevance.

Please contact the University of South Florida Technology Transfer office representative for submission – Karla Schramm at kschramm@usf.edu