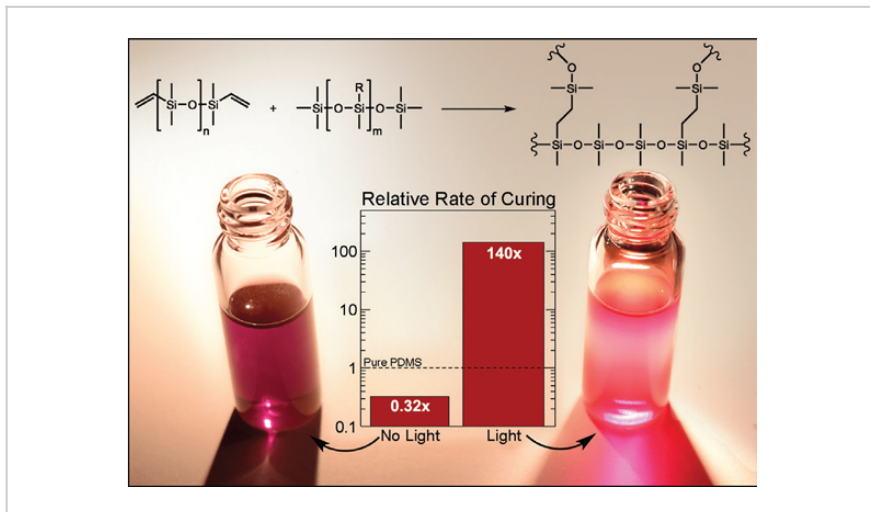


On-Demand Thermal Curing of Polymers for 3D Printing

ID# 2016-4509



PennState



Photothermal Effect Boosts Curing Rate

Technology Summary

Because of slow time scales associated with bulk heating/cooling, it's hard to stop the thermal curing of polymers using traditional approaches. Elevated levels of bulk-scale temperatures drive unwanted side reactions, limiting the temperatures for use and the rates of curing, making use of thermally cured polymers for 3D printing difficult. The Lear Laboratory provides on-demand thermal curing of polymer systems using nanoscale materials to efficiently convert light to heat. The light-to-heat conversion results in extreme temperatures near the nanoscale materials, which greatly enhances the rate of polymerization. The technology achieves billion-fold enhancements of polymerization rates while preserving desired chemical control over the final products.

Application & Market Utility

This technology provides on-demand, nanosecond control over the start/stop of the reaction and allows for reactions at much higher temperatures, allowing greater rates of polymerization. Applications include on-demand curing of coatings for technological applications and 3D printing.

Next Steps

Seeking research collaboration and licensing opportunities.

TECHNOLOGY READINESS LEVEL

1-3

Seeking

Investment | Licensing | Research

Keywords

- light to heat conversion
- thermal curing of polymers
- on-demand curing of polymers
- polymerization rate

Researchers

Benjamin Lear, Ph.D.

Lead Researcher

[Website](#)

Kailin Haas, Ph.D.

Research Partner

Joseph Fortenbaugh

Research Partner

Originating College

Eberly College of Science

Office of Technology Management Contact

Rokita, Joseph

jjr152@psu.edu

814-863-6336



Invent Penn State is a Commonwealth-wide initiative to spur economic development, job creation, and student career success. Invent Penn State blends entrepreneurship-focused academic programs, business startup training and incubation, funding for commercialization, and university-community collaborations to facilitate the challenging process of turning research discoveries into valuable products and services that can benefit Pennsylvanians and humankind. Learn more at invent.psu.edu.

Penn State is an equal opportunity, affirmative action employer, and is committed to providing employment opportunities to all qualified applicants without regard to race, color, religion, age, sex, sexual orientation, gender identity, national origin, disability or protected veteran status.