

## Tuning the Strength and Ductility of a Biomimetic Adhesive Through Breakable Bonds: Designing the "Ideal Adhesive"

**Track Code:** 2017-WILK-67740

**Categories:**

- Materials and Manufacturing

**Keywords:**

- Adhesives
- Materials
- Materials and Manufacturing

The ideal adhesive is both strong and ductile, which is the characteristic of toughness. Having these parameters seemingly at odds with each other, there has been some, but not much, effort to fill the technology gap. There exists a need to create an adhesive that is both strong and ductile in order to maximize performance.

Researchers at Purdue University have synthesized a biomimetic copolymer system that improves ductility of an adhesive by 45%. While the polymer alone exhibited brittle fracture, incorporation of ethylene glycol results in a brittle to ductile transition, and enhances the strength of the material substantially. The technology described provides a general design principle for creating ideal adhesives, balancing both strength and ductility.

**Advantages:**

- Increases ductility of an adhesive
- Balances both strength and ductility

**Potential Applications:**

- Adhesives
- Copolymer systems

**People:**

- Wilker, Jonathan James (Project leader)
- Mazzotta, Michael G
- North, Michael A.
- Putnam, Amelia Ann

**Intellectual Property:**

**Application Date:** June 30, 2020  
**Type:** NATL-Patent  
**Country of Filing:** United States  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** June 24, 2020  
**Type:** NATL-Patent  
**Country of Filing:** Japan  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** June 12, 2020  
**Type:** NATL-Patent  
**Country of Filing:** Australia  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** June 1, 2020  
**Type:** NATL-Patent  
**Country of Filing:** Canada  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** June 12, 2018  
**Type:** Provisional-Patent  
**Country of Filing:** United States  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** December 31, 2017  
**Type:** PCT-Patent  
**Country of Filing:** WO  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** December 31, 2017  
**Type:** NATL-Patent  
**Country of Filing:** Europe  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** (None)  
**Type:** NATL-Patent  
**Country of Filing:** China  
**Patent Number:** (None)  
**Issue Date:** (None)

**Application Date:** (None)  
**Type:** NATL-Patent  
**Country of Filing:** South Korea  
**Patent Number:** (None)  
**Issue Date:** (None)

**Contact OTC:**

Purdue Office of Technology Commercialization  
1801 Newman Road  
West Lafayette, IN 47906

Phone: (765) 588-3475

Fax: (765) 463-3486

Email: [otcip@prf.org](mailto:otcip@prf.org)