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Biomimetic Adhesives with Tunable Mechanical Properties

A novel biomimetic adhesive technology allows users to customize polymer moduli for specific substrates, enabling optimal bonding and balancing strength with ductility in applications like automotive, aerospace, and biomedical manufacturing.

Adhesives have a variety of uses and a variety of chemistries with formulations that include hot melt, rubber toughened, and pressure sensitive systems. Optimal bonding is needed for a range of substrates, joint geometries, and applications. A mismatch in stiffness between substrate and adhesive leads to stress concentrations and fracture when the bonding is subjected to mechanical load. Currently, there is a limited understanding of the properties that balance material strength versus ductility, and subsequently, the inability to create high performance optimized adhesives is present.

Researchers at Purdue University have developed a biomimetic terpolymer to optimize the ductility and toughness of an adhesive. This technology includes a composition of a novel biomimetic adhesive that is altered systematically to identify regions for optimal bonding. This technology includes the ability to "dial in" polymer moduli for specific substrates that can help solve material bonding problems in a wide variety of applications including rubber-to-metal bonding, flexible optical displays, and the construction of aerospace vehicles.

Advantages:

-Optimal balance between strength and ductility

-Efficient bondage between hard and soft substrates

Potential Applications:

Adhesives for the following industries:

-Automotive

Technology ID

2015-WILK-67233

Category

Chemicals & Advanced Materials/Coatings, Adhesives & Sealants

Materials Science & Nanotechnology/Biomedical & Bioinspired Materials

Aerospace & Defense/Advanced Protective Materials & Wearable PPE

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-Aerospace

-Biomedical

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Intellectual Property:

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