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Formulation of a Catechol-Containing Adhesive Polymer for Practical Applications

Practical catechol-based formulation bonds strongly underwater, is easy to handle, and outperforms marketed "wet" adhesives on many substrates.

Researchers at Purdue University have developed a new formulation for an adhesive that works well under water. Most adhesives perform poorly or fail in wet environments, limiting their usefulness for a wide variety of applications such as high-pressure pipes, water storage tanks, and subsea infrastructure maintenance. This novel adhesive formulation overcomes these existing challenges, providing a high strength bond even when completely submerged. Created with practical use in mind, this adhesive is also formulated to be easy to handle and apply. When tested against commercially available alternatives that are marketed for underwater use, this novel adhesive performed similarly or better depending on the substrates being used.

Technology Validation:

A systematic investigation of factors influencing the formulation of this adhesive for optimal underwater adhesive bonding was conducted. Emphasis was placed on handling, reproducibility, and scalability with a focus on examining various parameters such as solvent selection, polymer concentration, filler type and incorporation, water temperature, substrate, and physical movement. Adhesion performance was also evaluated using a variety of substrates. When compared to commercially available alternatives, the adhesive was found to have similar or improved bond strength depending on the substrates used.

Advantages:

-Easy to handle and apply

-Works well in wet conditions, even when completely submerged

-High bond strength

-Contains readily available, low-cost components

Technology ID

2025-WILK-70938

Category

Chemicals & Advanced Materials/Coatings, Adhesives & Sealants

Materials Science & Nanotechnology/Advanced Functional Materials

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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Applications:

Diverse industrial applications requiring underwater bonding of strong, flexible, and corrosion-resistant materials such as:

-High-pressure composite pipes

-Shock and vibration absorbing infrastructure

-Storage tanks

-Extended deployment of marine sensors

TRL: 4

Intellectual Property:

Provisional-Gov. Funding, 2024-12-04, United States

Keywords: Adhesive, biomimetic polymer, Chemistry, Chemistry and Chemical Analysis, Formulation, Manufacturing, Materials, Materials and Manufacturing, Mussels, underwater bonding