# Architectural And Material Design Aspects For Strong And Tough Interfaces

Tech ID: 33743 / UC Case 2024-958-0

## BRIEF DESCRIPTION

An innovative approach to joining materials that enhances strength and toughness at interfaces, inspired by natural structures.

## FULL DESCRIPTION

This technology involves the development of material components and multiscale designs, from macro to nanoscale, aimed at reducing stress at interfaces, preventing failure at stress points, and enabling the joining of multiple material types. Drawing inspiration from the natural world, specifically the adjoined forewings of terrestrial beetles, this approach utilizes a combination of modulated elliptical architectures, multilayered and multidirectional laminated microstructures, and nanoscale features to achieve its goals. These designs have been optimized for applications across aerospace, automotive, sports equipment, construction, and clothing industries, offering a revolutionary solution to the challenges of material joining.

## SUGGESTED USES

- Aerospace and automotive composites for enhanced structural integrity.
- Sports and personal protective gear, offering flexibility and removable options.
- Construction, particularly in building panels that require strong, integrated joints.
- Clothing, where durable and flexible joining of materials is beneficial.

## ADVANTAGES

- Reduces stress concentration at interfaces, minimizing the risk of failure.
- Enables the joining of dissimilar materials, broadening application possibilities.
- Incorporates reversible joining capabilities, allowing for easy disassembly and reassembly.
- Optimized through natural inspiration, leading to innovative and efficient design solutions.
- Adaptable to a wide range of applications, from aerospace to personal protective gear.

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| Patent Cooperation Treaty | Published Application | WO2025193304A1 | 09/18/2025 | 2024-958 |

Additional Patent Pending

## CONTACT

Ben Chu
ben.chu@uci.edu
tel: .




## OTHER INFORMATION

## CATEGORIZED AS

- **Materials & Chemicals**
  - Composites
  - Other
  - Textiles
- **Nanotechnology**
  - Materials
- **Engineering**
  - Other

## RELATED CASES

2024-958-0

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5270 California Avenue / Irvine,CA
92697-7700 / Tel: 949.824.2683

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