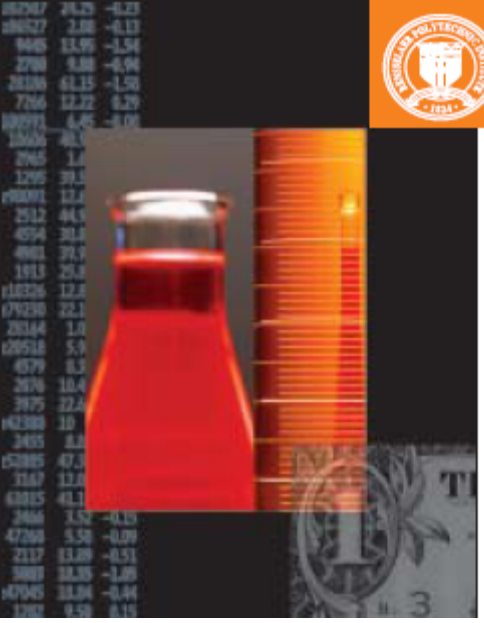
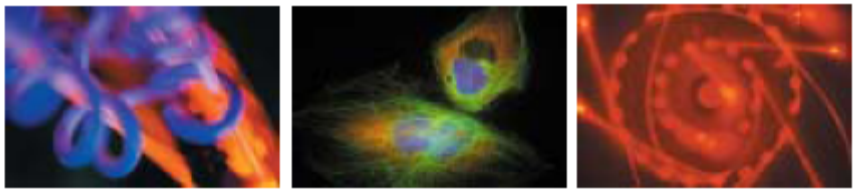




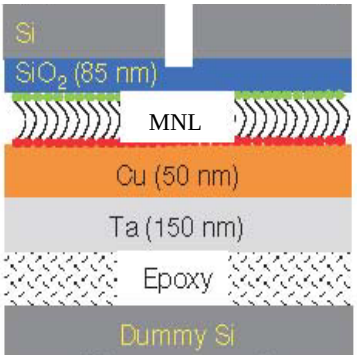
Seeks partner to commercialize

Molecular Nanoglue for Enhancing Interface Strength and Toughness

This invention provides a means to strengthen and toughen thin film interfaces by utilizing self-assembling molecular nanolayers (MNL) and thin films within the interface. These MNL's consist of short organic chains that are terminated with desired functional groups to modify surface properties, and are sandwiched between strengthening thin film layers. Annealing causes the bonds in these layers to grow stronger and form an extremely tough nanoglue.

When sandwiching the MNL between copper and silica and annealing above 400ºC, the resulting structure was 5 times tougher than a pristine Copper/Silica interface. Such high toughness values had previously only been achieved by using much thicker interface layers, which are less desirable for microelectronics.

This nanoglue continued to strengthen when heated up to 700º C - well above temperatures that would cause the unenhanced MNL's to degrade. This characteristic could support applications in extreme environments like aerospace engines and power turbines.



The molecular nanoglue is inexpensive, and the materials are readily available commercially. The method can be easily scaled up for large manufacturing applications.

▶ Benefits

- Obviates thick layered adhesives currently used
- Unprecedented bonding and toughening interfaces
- Can be combined with similar and or dissimilar interfaces consisting of organic, inorganic or metal films
- Continues to strengthen up to temperatures as high as 700 degrees Celsius

▶ Applications

- Active nanodevice components as low-switching voltage gate dielectric layer
- Passive barrier layers that inhibit interfacial diffusion, promote adhesion and/or toughen brittle nanoporous structures

▶ Publication

"Annealing-induced interfacial toughening using a molecular nanolayer", Nature, Vol. 477, pg. 299-303, May 17, 2007

FOR MORE INFORMATION

Rensselaer Polytechnic Institute
Office of Technology Commercialization
110 8th Street J Building
Troy, NY 12180-3590
(518) 276-6023
OTC@rpi.edu

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INVENTORS	Darshan Gandhi, Ganapathiraman Ramanath
OTC CASE	1101

Mind to Marketplace