

Biometric polymer adhesive will bond underwater

In the first ever issue of ITS News, we ran an article explaining how a US team at the University of Texas Arlington had used biological information from Mussels to develop a synthetic family of adhesives, which could provide an alternative to fibrin glue and cyanoacrylate adhesives.

Now five years on, in completely separate experiments, scientists from the Purdue University in West Lafayette have developed a strong biomimetic polymer, which is also modelled on the adhesives proteins of mussels. These molluscs extend fine fibres that help them attach to surfaces using plaques of adhesive. Proteins within the adhesive contain the amino acid DOPA, which holds the



chemistry needed to provide strength and adhesion. The team from Purdue inserted this chemistry of mussel proteins into a biomimetic polymer called Poly (catechol-styrene), creating an adhesive by harnessing the chemistry of compounds called catechols, which are contained in DOPA.

The researchers compared the Poly (catechol-styrene) adhesive with other commercially available adhesives in the study. They found that the new biomimetic

adhesive did better when bonding wood, aluminium and even with Teflon. Tests were undertaken within controlled laboratory conditions. Poly (catechol-styrene) proved 17 times stronger than the natural adhesive produced by mussels. It works extremely well underwater even in harsh conditions and could be used for wet bonding.

The next stage will be further field tests, should these prove positive then the potential for practical marine applications is wide.