

Universal Doubly Cross-linked Nano-adhesive for Bonding of Heterogeneous Substrates

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An adhesive is a material that allows bonding of two substrates by first wetting them and curing them into a cohesively strong solid. However, most of the current adhesives are not compatible for bonding of surfaces with micro- and nano-structures. This is due to their highly viscous and thick nature, which causes the substrates to lose all the detailed surface morphology. To circumvent this issue, we report a nano-scale adhesive using the initiated chemical vapor deposition (iCVD) that can achieve bonding of various organic and inorganic materials while maintaining the morphology of the system. This system is also applicable to the sealing of microfluidic devices. The use of iCVD in sealing of different, non-PDMS devices can achieve a high bonding strength. Burst pressure measurements indicate that all the substrates successfully bond with an average value of 2.7 MPa. This adhesion strength is maintained even after exposure to different solvents such as acetone, toluene and tetrahydrofuran(THF) and to high temperature of up to 200°C. This adhesive system thus allows the introduction of new substrates to microfluidics and opens up new, potential areas of applications.