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Strengthening and Toughening Effects by Strapping Carbon Nanotube Cross-Links with Polymer Molecules

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ABSTRACT: Cross-linked carbon nanotube (CNT) networks provide efficient load and charge transfer within their assemblies. Injection chemical vapor deposition (iCVD) has been widely used to obtain such structure with rich cross-links. However, in the iCVD process, a certain organic by-products, probably dioctyl phthalate (DOP) molecules, co-exist in the CNT network, which degrade the interfacial property between CNTs. The removal of the DOP-like molecules can remarkably strengthen the CNT cross-links, improving the assembly's modulus, but it also causes significant loss in toughness. Here we report that strapping up the strengthened cross-links with long-chain and inherently polar polymer polyvinylidene fluoride (PVDF) can result in

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