

### Mechanical Strength Enhancement of Carbon Nanotube Yarns by Covalent Cross-linking

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The carbon nanotube yarns are composed of axially aligned and highly packed carbon nanotubes by weak inter-molecular interaction, van der Waals forces. Covalent cross-linking between intertube is necessary for the high strength of carbon nanotube yarns. Friedel-Crafts acylation reaction, a one-step addition reaction, was carried out using azelaic acid dichloride as a cross-linker. Acyl chloride groups of its both ends reacted to the side wall of carbon nanotubes, making covalent linkages between neighboring carbon nanotubes. The acylated carbon nanotube yarns were characterized by FT-infrared spectroscopy, X-ray photoelectron spectroscopy, scanning electron microscopy, and transmission electron microscopy, and also examined for their mechanical properties. Mechanical measurement showed that the tensile strength of carbon nanotube yarns was increased after the covalent cross-linking.