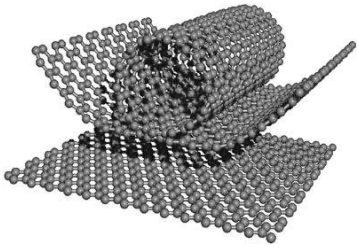
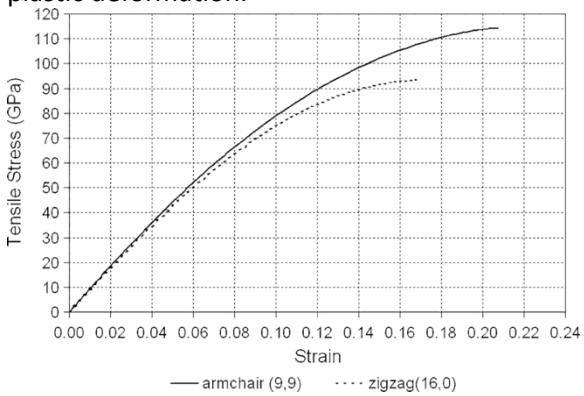
Carbon Nanotubes by Leonie Cheung and Mia White

Carbon nanotubes are cylindrical molecules that consist of rolled up sheets of single layer carbon atoms.



Mechanical properties of carbon nanotubes

Carbon nanotubes have an extremely high tensile strength and Young's modulus. In comparison to steel, their Young's modulus is 5 times greater and tensile strength 100x greater, for steel of the same diameter. This is due to strong covalent bonds and the molecular nature of carbon nanotubes. As the nanotube is one molecule of unbroken interlocking carbon - carbon bonds, there are no weaknesses to be exploited under force, unlike the abundant weaknesses of crystalline materials. Additionally, carbon nanotubes also behave elastically for great amounts of force before undergoing plastic deformation.



Comparison of two types pf carbon nanotubes in term of tensile stress and strain.

Uses of carbon nanotubes in construction

Currently carbon nanotubes are very expensive so they are used as additives to strengthen current materials. In cement carbon nanotubes can be used to reinforce because of its high tensile strength so the concrete will be more durable, they have shown to reduce the occurrence of cracks compared with cement without carbon nanotubes. While in bridge construction they could replace steel cables on suspension bridges because their tensile strength is 100x greater than steel and they are lightweight and flexible.

Sources:

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