

# **Effect of the CVD parameters on the fiber tensile strength of carbon fibers with growth carbon nanotubes using single-fiber tensile test**

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Carbon nanotubes (CNTs) are grown on PAN-based carbon fibers by Chemical Vapor Deposition (CVD) to improve inter- and intra-ply mechanical properties and reinforce the interface between carbon fibers and the polymer matrix on the composite. The growth process has resulted in reductions in the fiber tensile strength (~30-50%) as noted in others works. This process occurs in temperature ranges between 650 °C and 800 °C, depending on the catalyst composition, process gas mixture and the growth time. The effect of various CVD grown parameters are studied in this work, noting how each influences the mechanical properties of the carbon fiber using single-fiber tensile tests, observing stress-strain curves and modulus of elasticity. We use the Weibull Distribution for probabilities of fractures of the fibers in different cases. We also show CNTs growth via C<sub>2</sub>H<sub>2</sub>/CO<sub>2</sub> employing Fe<sub>2</sub>Ni as catalyst. Scanning electron microscope and Raman microscope will be used to analyze the characteristic of CNTs grown on the fiber and the influence on the mechanical tensile properties.