PROCESSING OF CARBON NANOTUBES AND CARBON NANOFIBERS TOWARDS HIGH PERFORMANCE COMPOSITE MATERIALS

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Carbon fiber reinforced composites (CFRP) are among the most promising novel materials for lightweight construction in high-performance applications like aeronautics or automotive industries. CFRPs consist of high strength, high modulus carbon fibers with graphitic structure usually embedded in a thermoset matrix like epoxy. On the one hand this combination provides a lighter and stronger material than steel but on the other hand anisotropic properties due to their laminated structure. The connection between to neighboring carbon fiber layers is determined by the properties of the polymer matrix.

In this work nanoscale fillers like carbon nanotubes (CNT) and carbon nanofibers (CNF) were added to the epoxy matrix of a CFRP to improve the mechanical properties of the whole composite. In order to achieve a high dispersion quality of the fillers in the resin, a three-roll mill (calender) was used. The performance of pristine, surface modified CNTs and CNFs during the processing and the resulting properties in mechanical tests are compared and evaluated.