



ULTRASONIC TECHNOLOGY FOR DISPERSION OF NANOFILLERS: REINFORCEMENT OF RIGID AND SOFT POLYMERS

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Novel ultrasonic plastic and rubber single- and twin-screw extruders were developed to disperse nanoclays, carbon blacks, CNFs and MWNTs in polymers. The effects of ultrasound and loading of nanofillers on die pressure, rheological, mechanical, electrical and morphological properties of PEI/MWNT, PEEK/MWNT, LCP/CNF, PETI-330/MWNT, PA6/clay, PEI/CNF and PEEK/MWNT and SBR/CB, SBR/CNF and SBR/MWNT were studied. Ultrasonic treatment caused a reduction in pressure and electrical percolation of nanocomposites and an increase in the Young's modulus and tensile strength in most cases. The reinforcement effects were found to strongly depend on the rigidity or softness of the polymer matrix. Penetration of the macromolecular chains into nanofiller agglomerates was achieved by ultrasonic treatment at high amplitudes leading to strong interactions between the molecular chains and nanofiller.