Effect of aspect ratio and bulk density on the electrical and rheological properties of the PP/MWCNT nanocomposites

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We investigated electrical conductivity and rheological properties of polypropylene (PP)/MWCNT nanocomposites. Several different MWCNTs with different aspect ratios and bulk density were used in this study. Different MWCNTs showed different electrical conductivities and rheological properties. Dispersion state of the MWCNT were inferred by the rheological properties of PP/MWCNT. It was proved that better dispersion state of MWCNT results in higher electrical conductivity of the PP/MWCNT. It was observed that bulk density of MWCNT is critical factor affecting the electrical conductivity of PP/MWCNT. The lower bulk density provided the higher electrical conductivity of the PP/MWCNT nanocomposites. Some MWCNTs were obtained from same manufacturer with same grade name but obtained at different date (different Lot. #). The MWCNTs with same grade name but different Lot. # exhibited different bulk densities and dispersion state in the nanocomposites. As a result, they provided large difference in electrical conductivity of PP/MWCNT.