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Electrical Properties of Conducting Polyphenylene Sulfide Graphite Hybrid Composites

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Abstract

The effect of addition of second conducting component namely Carbon Black (CB) in Polyphenylene sulfide (PPS)-Graphite composites prepared by powder mixing route on the electrical properties has been investigated. It has been found that the percolation threshold in PPS-Graphite composites lie between 7- 10wt% Graphite. PPS-7 wt% Graphite exhibit a conductivity of the order of $\sim 10^{-11}$ S/cm which increases to nearly five orders with 2wt% CB addition as revealed in the frequency dependent measurements. Hopping type of conduction takes place at higher loading of CB (>3wt%). Addition of CB in to PPS-Graphite composites leads to better connectivity between the filler increasing the conductivity. Experimental results show that CB occupies predominantly the inter graphitic space which implies that the effective dielectric constant should increase along with the junction capacitance. Room temperature dielectric studies show that at low frequencies (0.1HZ), the effective dielectric constant increases from 100 to 10^7 for 3.2wt% CB when compared with 0wt% CB. Impedance measurements on these composites leads to evaluation of junction capacitance which increases from 44 pF for 0wt% CB to 75pF for 3wt% CB proves that the CB particles can occupy the inter space between graphite particles. The structural characterization of the composites has been carried out with XRD and it has been found that after sintering at 240°C

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