

A

Dissertation on

**ELECTROMAGNETIC INTERFERENCE SHIELDING EFFECTIVENESS
OF POLYARYLETHERKETONE/GRAPHENE NANOCOMPOSITES**

Submitted in the partial fulfilment of the requirements of the degree of

Master of Technology in Physical Metallurgy

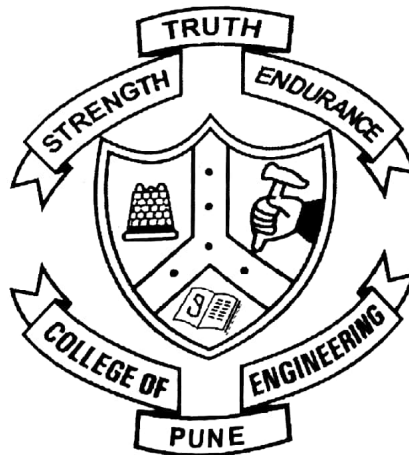
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Abstract

The unique properties of graphene, such as high specific surface area, aspect ratio and electrical conductivity, make it very promising to fabricate electromagnetic induction (EMI) shielded materials. Electrical properties of graphene filled polyaryletherketone (PAEK) nanocomposites prepared by hot pressing were investigated for EMI shielding applications. Highest electrical conductivity of 2.16 S/m was achieved for 5 vol% nanocomposite. This is around eleven orders of magnitude increase in conductivity compared to pure PAEK. This increase in electrical conductivity of the nanocomposites leads to the tremendous increase in EMI shielding effectiveness (EMI-SE). Highest EMI-SE of ~ 33 dB was achieved for 1 mm thick 5 vol% graphene/PAEK nanocomposite whereas ~ 23 dB was achieved for 3 vol% graphene/PAEK nanocomposite with the same thickness. Effect of thickness variation on EMI-SE was also studied. It was found that the EMI-SE increases with increasing thickness of the sample. Thermogravimetric analysis of nanocomposites indicates that thermal stability does not increase significantly however, the residual weight (or char yield) increases with increasing graphene content. Linear coefficient of thermal expansion was found to decrease by $\sim 6\%$ for 5 vol% graphene/PAEK nanocomposite compared to pure PAEK.