

## Fractal Analysis of Polyacrylamide-Graphene Oxide Composite Gels

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**Abstract :** The fractal analysis is a bridge between the microstructure and macroscopic properties of gels. Fractal structure is usually provided to define the complexity of crosslinked molecules. The complexity in gel systems is described by the fractal dimension ( $D_f$ ). In this study, polyacrylamide- graphene oxide (GO) composite gels were prepared by free radical crosslinking copolymerization. The fractal analysis of polyacrylamide- graphene oxide (GO) composite gels were analyzed in various GO contents during gelation and were investigated by using Fluorescence Technique. The analysis was applied to estimate  $D_f$  s of the composite gels. Fractal dimension of the polymer composite gels were estimated based on the power law exponent values using scaling models. In addition, here we aimed to present the geometrical distribution of GO during gelation. And we observed that as gelation proceeded GO plates first organized themselves into 3D percolation cluster with  $D_f=2.52$ , then goes to diffusion limited clusters with  $D_f =1.4$  and then lines up to Von Koch curve with random interval with  $D_f=1.14$ . Here, our goal is to try to interpret the low conductivity and/or broad forbidden gap of GO doped PAAm gels, by the distribution of GO in the final form of the produced gel.

**Keywords :** composite gels, fluorescence, fractal, scaling

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