**Abstract**

The polymer nanocomposite has become world-wide research interest for developing polymeric materials with improved and desired properties by incorporation of the nanoscale materials into polymer matrix [1, 2]. Due to their nanometre size dispersion, nanocomposites exhibit markedly improved properties when compared with the pure polymers or conventional composites. In this work, the solid-phase photocatalytic degradation of polystyrene-silver nanocomposite (PS/Ag) was investigated under the ambient air in order to assess the feasibility of developing photodegradable polymers. PS-Ag nanocomposites were prepared by using Ex-situ solution method in which various concentration (0.5%, 1%, 1.5%) of Ag nanoparticles were dispersed by constant stirring. The prepared nanocomposites such as PS-Ag (0.5%), PS-Ag (1%), PS-Ag (1.5%) and pure PS were exposed to UV irradiation for various time intervals i.e. 0, 30 and 60h. On increasing irradiation time, increase in degradation efficiency was observed. Moreover, the effect of UV radiation on its structural, optical and degradation properties of various PS-Ag nanocomposites have been studied. Further, SEM analysis reveals the morphological nature of the nanocomposites and confirms the photo degradation of nanocomposites. Results indicate that an increase in AgNPs concentration with polystyrene matrix enhances the photo-catalytic degradation of PS-Ag nanocomposite. Hence the influence of Nano silver particles and its efficient contribution in degradation of polymer was confirmed. The process of photo degradation has been enhanced because of the addition of silver nano particles in the polymer matrix and the results are clearly elucidates the effect of silver in the degradation of polystyrene host materials.