O15 | **Positron spectroscopic studies of polymer nanocomposites: an overview**

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Polymer nanocomposites (PNCs) are multiphase materials made of polymer matrix reinforced with nanodimensional inorganic fillers [1]. PNCs are shown to have improved mechanical, electrical and thermal properties compared to pure polymers. As a result, PNCs are shown to have increased applications in various industries [2]. The enhancement in the bulk properties are generally correlated to morphology and properties of nanofillers. In recent years, it has been shown that on incorporation of nanofillers in polymer matrices, the molecular level structure of polymer phase is altered. In this regard, formation of an interfacial layer around the nanofillers due to interfacial interaction is well accepted phenomenon in the field of polymer nanocomposites. Investigation of factors responsible for the creation of interfacial layer, structure of interfacial layer as well as its correlations with the bulk physical properties is an active area of research. In last few years, we have used positron annihilation lifetime spectroscopy (PALS) for the investigation of free volume structure in variety of polymer nanocomposites supplemented by other conventional characterization techniques [3-10]. These studies have shown that free volume size, their number density as well as their size distributions are altered in polymer nanocomposites. The observed variations have been explained considering the formation of an interfacial layer. The studies have shown that the free volume characteristics of interfacial layer primarily depend on interfacial interaction between nanofillers and polymer molecules along with the shape and size of nanofillers. The role of interfacial layer characteristics on mechanical and thermal properties has been investigated. An overview of our recent studies on polymer nanocomposites using PALS will be discussed.

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