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New approach in graphene-oxide polybenzoxazine nanocomposites synthesis

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In this work, we propose an original route to synthesize new benzoxazine – functionalized graphene oxide monomers (GO-BZ). The new method consists in the growth of the benzoxazine rings directly on the graphene oxide (GO) surface. In order to obtain the GO-BZ monomers the chlorination method using SOCl2 was employed. Firstly, the carboxylic groups from graphene oxide surface are acylated and then treated with a hydroxyamine (TYR) in order to synthesize hydroxilic groups on graphene oxide . These groups react further on with amine and formaldehyde to give the benzoxazine rings (Figure 2) which are polymerized in order to produce the polybenzoxazine matrix which will include the graphene oxide`s exfoliated layers within the polymer. Finally a nano structure with strong bonds between the graphene sheets and the polybenzoxazine chains is achieved. The formation of multi-benzoxazine functionalized graphene oxide was checked by FT-IR, 1H-NMR, TGA, Raman spectrometry, XRD, HR-TEM and XPS analysis. The benzoxazine rings previously obtained will be subsequently polymerized to produce the polybenzoxazine structure including the graphene oxide sheets exfoliated within the polymer mass. The benzoxazine polymerization may take place either between the rings of the same GO layer ("in-graphene" polymerization) or between the rings of two neighbors of GO layers ("out-graphene" polymerization), in the end obtaining a nanostructure with strong bonds between the graphene sheets and the polybenzoxazine chains.

Biography

Elena Iuliana Bîru has completed her MSc studies in Polymer Science and Engineering at University Politehnica of Bucharest, Faculty of Applied Science and Materials Science. She is a PhD student since 2016 at University Politechnica of Bucharest, Advanced Polymer Materials Group. Her main research field refers to covalent functionalization of graphene oxide with polymers.

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