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Synthesis of novel magnetic nanomaterials from functionalized polyolefin oligomers through sustainable chemistry

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Nowadays terminally functionalized polyolefin oligomers can be modified to serve as solubilizing agents to make various polyolefin additives highly soluble in melt phases. Moreover, we have functionalized polyethylene (PE), polypropylene (PP) and Polyisobutylene (PIB) oligomers, converting them into a wide variety of derivatives. For example, antioxidants and photostabilizers are the most prevalent additives for polymers, particularly for polyolefins. Both are important in protecting products during high temperature processing and providing them with longer lifetimes in service under environmentally stressful conditions. These additives could be bind to functionalized oligomers and melt mixed into the desired materials homogeneously. Magnetic nanoparticles (MNPs) have a versatile scope of applications than carbon nanotubes as they are used in biomedicine, in catalysis, and in materials chemistry. Moreover, MNPs have also been used to form nanocomposites with PE and PP. Polyolefin composites/MNP are currently investigated at Qatar Petrochemical Company (QAPCO, at Qatar) with loadings and microscopy studies. Moreoever, we have efficiently synthesized PE and PIB oligomer bound dyes, and use these oligomers to design nanoparticles (MNPs) that are soluble in PE and PP melts. These bound species will then be used to modify bulk PE and PP solids or to modify the surface of PE and PP powders or films. These materials will be tested in collaboration with QAPCO's R&D labs and commercialize in future.

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