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***In situ* Synthesis of Organic-inorganic hybrids or Nanocomposites from Sol-Gel Chemistry in molten polymers**

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ABSTRACT

This survey is dedicated to the synthesis of nanocomposite and organic-inorganic hybrids from sol-gel chemistry under polymer processing. Depending on the nature and reactivity of the inorganic precursors as well as the processing parameters, different types of filler and functionality can be created. These points are discussed for the *in situ* synthesis of silica and titanium oxide. The influence of the nature of the polymer matrix, its affinity with the initial inorganic precursors or the inorganic phase during growth is evidenced in the case of the study of polyamide/silica composites. In addition, other parameters, such as the addition of water during polymer processing, are shown to increase the rate of the conversion of the hydrolysis-condensation of the inorganic precursor, and thereby affect the final morphology. Another important finding of this survey demonstrates the potential for *in situ* synthesis of functional nanofillers using appropriate inorganic precursors. This represents a new and original way to prepare new polymer materials with functionalities relevant to a number of applications, such as optical, mechanical reinforcement, fire retardancy and biocide properties.

KEYWORDS: Sol-gel, Reactive extrusion, Nanocomposite, Hybrids

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