



## Renewable Polymers and Polymer-Metal Oxide Composites

Synthesis, Properties, and Applications

Metal Oxides

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## 8 - Synthesis and properties of percolative metal oxide-polymer composites

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## Abstract

The synthesis of metal oxide and their polymer-based composites has received considerable interest in a variety of research fields mostly in energy storage devices because of the superior electronic properties and better functional performances. Moreover, polymeric materials show excellent flexibility and durability for solution-based fabrication of homogeneous composites. Thus, metal oxide-based polymer composites are superb materials for electronics to be utilized in supple electronic devices due to the union of the qualities of their components. The various synthesis techniques of metal oxide signify better purity, superior dispensability, economical viability, and easy processing. These metal oxides have broad spectrum of physical and chemical properties, which leads to excellent applicability in high energy storage domain.

The metal oxide and their polymer composites have possible applications for specific concentration at percolation threshold that has increased to an amazing scale, which open new window of challenges and opportunities for the promotion of individual property of the materials. This chapter is concluded with the discussion of significant persuade on the percolation threshold as well as electrical properties of conductive filler-used polymer composites. Particularly, representative metal oxide-based polymer composites are introduced and their dielectric and electrical properties with respect to percolation threshold are represented. The nanocomposites have improved properties make them suitable for applications in energy storage devices, which emerge with current challenges and openings of these promising materials.

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## Keywords

Polymers; Metal oxides; Nanocomposites; Dielectric properties; Electrical properties; Percolation threshold

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