

Preparation of Polymer Composites with Metal Oxides for IR Shielding

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Materials for infrared shielding can be used in many different applications, such as heat shielding in smart windows. For this purpose many different materials have been studied, such as indium tin oxide (ITO), antimony tin oxide (ATO), tungsten oxide (WO₃), lanthanum hexaboride (LaB₆). In our investigations we have prepared polymer composites (polyvinyl alcohol matrix) with different amounts of inorganic fillers, i.e. zinc oxide (ZnO) and iron oxide (Fe₂O₃). We have studied the influence of the amount of the filler and the preparation method on the properties of the obtained composites.

Preparation of the composites involved using either an ultrasonic homogenizer or a planetary ball mill. The obtained composites were characterized with FT-IR spectroscopy (in attenuated total reflectance – ATR and in transmission mode), thermogravimetric analysis (TGA), and optical microscopy. The heat shielding was examined by a thermal insulation experiment.

The results show that both the preparation method and the amount of the filler have great impact on the physicochemical properties of the obtained composite.

Biography:

Dr. Marta Mazurkiewicz-Pawlicka is an assistant professor at the Faculty of Chemical and Process Engineering, Warsaw University of Technology since 2016. She obtained her doctorate from the Faculty of Materials Science and Engineering, Warsaw University of Technology for the thesis focusing on preparation of palladium catalysts on carbon nanotubes used in direct formic acid fuel cell. Her work focuses on carbon nanomaterials, their functionalization and applications in low-temperature fuel cells and polymer composites. She is an author of 28 scientific papers published in international peer-reviewed journals.