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Structure and Properties of Exfoliated MoS₂-Polyaniline Nanocomposites

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Molybdenum disulfide was produced in an exfoliated state by combining molybdic acid with an excess of thiourea at 500°C under nitrogen. Nanocomposites of the conducting polymer polyaniline (PANI) and exfoliated MoS₂ were then synthesized. The nanocomposites with varying percentage by weight of exfoliated MoS₂ were characterized using powder X-Ray diffraction, electrical conductivity measurements, Seebeck coefficient measurements, thermogravimetric analysis, scanning electron microscopy, and transmission electron microscopy. An intriguing result was seen in the conductivity data, where several of the nanocomposites containing relatively small percentages of exfoliated MoS₂ yielded higher conductivity overall in comparison to a sample of pure PANI. The exfoliated MoS₂ used in this work is highly disordered, and is expected to be predominantly the 2H polytype. This form of MoS₂ has very low conductivity, thus the increased conductivity of the nanocomposite suggests that PANI is most likely stabilizing MoS₂ in its 1T metallic form, which is higher in conductivity.

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