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Recycling Copper and Polystyrene from Solid Waste Stream in Developing Conductive Composites

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Source: The Journal of Solid Waste Technology and Management, Volume 45, Number 1, February 2019, pp. 39-44(6)
Publisher: The Journal of Solid Waste Technology and Management
DOI: <https://doi.org/10.5276/JWTM.2019.39>

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Combining Polystyrene and copper waste in the production of conductive composite is of combined economic and environmental sustainability interest. In the present work, conductive composites of micro copper particle and a solvated polystyrene resin were prepared. The graded copper particles were thoroughly mixed with the solvated polystyrene resin by simple mechanical stirring, using hand lay-up process and cold pressing into the desired shapes. The conductive composites were prepared with varying content of copper and the electrical conductivity of the resulting composites was determined using a four point probe method. The composites were further characterised using laboratory-made density setup and metallurgical microscopy. A conductivity of $4.57 \times 10^{-8} \text{ S cm}^{-1}$ was achieved with 10 wt% loading of copper and a maximum conductivity of $2.53 \times 10^{-7} \text{ S cm}^{-1}$ was achieved with 40 wt% of copper content. The density and microscopy results showed that the composites have increasing conductive network as the composition of copper increased in the solvated polystyrene matrix. The obtained results for the conductive composites prepared indicated a high potential for their successful use in electrical and electromagnetic applications.

Keywords: CONDUCTIVE COMPOSITES; COPPER WASTE; POLYSTYRENE WASTE; RECYCLING

Document Type: Research Article

Publication date: 01 February 2019

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