

Separation of Composites for Recycling: Measurement of Electrostatic Charge of Carbon and Glass Fiber Particles

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Abstract : Composite waste from manufacturing can consist of different fiber materials, including blends of different fiber. Commercially, the recycling of composite waste is currently limited to carbon fiber waste and recycling glass fiber waste is currently not economically viable due to the low cost of virgin glass fiber and the reduced mechanical properties of the recovered fibers. For this reason, the recycling of hybrid fiber materials, where carbon fiber is combined with a proportion of glass fiber, cannot be processed economically. Therefore, a separation method is required to remove the glass fiber materials during the recycling process. An electrostatic separation method is chosen for this work because of the significant difference between carbon and glass fiber electrical properties. In this study, an experimental rig has been developed to measure the electrostatic charge achievable as the materials are passed through a tube. A range of particle lengths (80-100 μm , 6 mm and 12 mm), surface state conditions (0%SA, 2%SA and 6%SA), and several tube wall materials have been studied. A polytetrafluoroethylene (PTFE) tube and recycled without sizing agent was identified as the most suitable parameters for the electrical separation method. It was also found that shorter fiber lengths helped to encourage particle flow and attain higher charge values. These findings can be used to develop a separation process to enable the cost-effective recycling of hybrid fiber composite waste.

Keywords : electrostatic charging, hybrid fiber composites, recycling, short fiber composites

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