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Overlap Welding of Graphite/Polymer Composite for PEFC Separator Using Diode Laser

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This study deals with the development of an efficient overlap welding of graphite/polymer composite separators for polymer electrolyte fuel cell (PEFC) using a diode laser. It is difficult to make fine channels on the surface of thin separators of graphite/thermoplastics composites by injection molding because of their high viscosity. We investigated the laser processing of overlap welding of graphite/polypropylene composite sheets to form covered fine channels using a laser-transparent glass mold as a heat sink. This welding procedure is able to achieve both the high weld strength and excellent surface appearance without causing thermal damage of the surface as often suffered in conventional direct infrared radiation welding process for black-colored articles. The feasibility experiments and thermal analysis on this process were performed.