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Effect of chemical oxidizer on material removal rate in electrochemical oxidation assisted machining

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Abstract

Mechanical machining of brittle material is difficult due to generation of fracture or cracks on machined surfaces. Glassy carbon (GC) is a brittle carbon material having outstanding mechanical and chemical characteristics making it suitable for use in glass molds. However, brittleness of GC makes its machining complicated and difficult. In order to fabricate GC surfaces with minimum cracks, hybrid machining processes utilizing electrochemical oxidation have been proposed. In the present study, a new, mixed acidic electrolyte incorporating a chemical oxidizer was utilized to improve the material removal rate of electrochemical oxidation assisted machining. Machining experiments were conducted to evaluate and to confirm the effect of the oxidizer-mixed electrolyte on material removal.

Keywords: Hybrid machining; Brittle material; Micromachining; Glassy carbon