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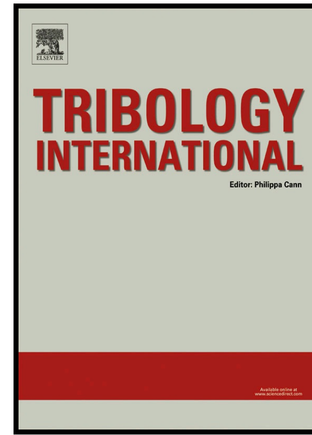

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Investigation of chemical tooth mechanism in chemical mechanical planarization of germanium

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Abstract

The effect of pH on germanium (Ge) chemical mechanical planarization (CMP) removal rate (RR) using polymorphs of titania was investigated. Rutile and anatase polymorphs of titania were used to study the removal rate of germanium in absence of oxidizer. Polishing experiments performed using rutile titania showed highest removal rate at pH 3, and subsequently decreased with pH and became negligible at pH 11. However, no material removal was observed with anatase polymorph for the entire pH range investigated in this work. Higher Ge removal using rutile abrasive can be attributed to the formation of Ti-O-Ge bond due to the structural similarity of polishing surface and abrasive. Ge RR showed a linear relationship with pressure and table speed, following Prestonian behavior.

Graphical Abstract

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