

Project Title: *Effect of additives on germanium chemical mechanical planarization slurries*

Project I.D: DR2017004

Summary

The etch rate (ER) and the removal rate (RR) of germanium using potassium metaperiodate (KIO_4) as oxidizer in titania (anatase) based chemical mechanical planarization (CMP) slurries have been investigated. The solubility of KIO_4 is enhanced by addition of 0.1M KOH in the solution. In the dissolution study, ER of Ge was found to increase with pH from 3 to 11, initially ER with KIO_4 concentration increases and then gets levelled off. The dependency of Ge RR on KIO_4 concentration, pH of the slurry, turntable speed and down pressure were also studied. Polishing only with 1 wt% titania showed no significant removal. RR was observed when Ge coupon was polished with 1 wt% titania in presence of 1 wt% KIO_4 + 0.1M KOH. Higher RR of titania slurry, in the presence of 1 wt% KIO_4 + 0.1M KOH could be explained as due to the synergetic effect of chemical etching and abrasive polishing. In the presence of KIO_4 removal is due to oxidation of Ge to form GeO_2 , with subsequent oxidation to form soluble species. It was observed that Ge removal rate follows non-Prestonian behaviour.

Project Outcome

A. Gupta, S. N. Victoria and R. Manivannan, "Chemo-Mechanical Planarization of Germanium Using Potassium Periodate based Titania Slurries," *ICPT 2017; International Conference on Planarization/CMP Technology*, Leuven, Belgium, 2017, pp. 1-6. (ISBN No. 978-3-8007-4462-6)

