Recovery of polyalkylene glycol from silicon cutting waste using centrifugation

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ABSTRACT

A great amount of slurry waste is formed during the cutting process from silicon ingot to wafers. More than 50% of this waste comes from cutting liquids. This study investigated centrifugation to recover polyalkylene glycol (PAG) cutting liquid with low turbidity (<100 NTU). The experimental results show that clean PAG liquids could be obtained by using water as a diluent. Because water with high chemical polarity and strong hydrogen bonding would destroy the adsorption of PAG molecules on particles, and weaken the steric stabilization, the particles are aggregated and then separated from liquids by centrifugation. After 50 wt.% water-assisted centrifugation at 3,253 G-force for 24 h, the solid content of the upper liquid decreased to 0.018 g/L, and the turbidity reduced to 7.2 nephelometric turbidity units (NTU). The obtained liquid was then vacuum distilled to remove water. The final recovered PAG with only 0.43 NTU could be reused in the cutting process.

Keywords: Recovery; Polyalkylene glycol; Cutting liquid; Silicon cutting waste; Centrifugation

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