Separation of Si and SiC by selective adsorption

오영준, 정대수, 박승빈*
KAIST 생명화학공학과
(SeungBinPark@kaist.ac.kr*)

Polysilicon is produced throughout Siemens or fluidized bed reactor. Silicon ingot is made by crucible melting to achieve single crystal of silicon, namely Czochralski process. In order to manufacture silicon wafer, silicon crystal is sliced by multi-wire saw with an ethylene glycol-based solution containing silicon carbide (SiC) abrasives. During the slicing process, about 30 % of silicon loss occurs and slurry is composed of silicon kerf, SiC particles, cutting oil and metal fragments from the wire saw. The objective of this work is to recover silicon and silicon carbide from the waste slurry and separate two materials.

In the present research, we attempted to separate Si and SiC by using their different surface characteristics and selective adsorption of surfactant. Dodecyltrimethylammonium chloride (cationic surfactant) can adsorb on SiC surface and provide hydrophobicity since it has long hydrophobic chain. By varying pH in surfactant solution, electrostatic force is induced between the cationic surfactant and SiC surface, so that the amount of adsorbed surfactant is increased. Nitrogen gas supplied from the bottom of column makes SiC particles floated and finally Si particles can be recovered.