

Production of silicon from rice husk by aluminum reduction of rice-husk

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Highly pure silicon and silicon compound are required for semiconductors and solar cells. Rice hulls consist of approximately 80 wt% of organic components such as cellulose and 20 wt% of inorganic components. About 95wt % of the inorganic components are silica (SiO₂). Rice plants absorb water-soluble siliceous ions via roots. These ions are transported to stems, leaves and rice hulls by sap flow. In rice hulls, siliceous ions accumulate at the cuticle outside of the epidermis.

In this research, polycrystalline silicon of high purity has been prepared by metallothermic reduction of purified rice-husk by using aluminum. The influence of morphology, crystallinity and porosity of rice hull silica on the characteristics of silicon was studied. The effect of reaction temperature, atmosphere, contact time and additive materials on the final purity of silicon was also investigated. Characterization of the prepared silicon was carried out by SEM-EDS, TEM, XRD and ICP-AES method.