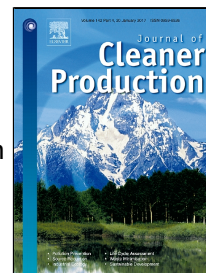


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# Electromagnetic separation of silicon carbide inclusions with aluminum penetration in silicon by imposition of supersonic frequency magnetic field

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## Abstract

A large amount of silicon in the form of silicon scraps is wasted annually in photovoltaic industry because of the presence of silicon carbide inclusions. Silicon carbide inclusions must be eliminated so that silicon scraps can be recycled. This study investigated the electromagnetic separation of silicon carbide inclusions in multicrystalline silicon by imposition of supersonic-frequency magnetic field. Silicon carbide particles tend to migrate to the ingot side and to the top and bottom of the central region of the ingot under increasing holding time. During separation process, the penetrating aluminum can react with silicon carbide and then dissolve some of the inclusions. In this work, the separation efficiency reaches up to 89.3% at a holding time of 45 min. This method is a potentially effective means of recycling silicon scraps.

**Keywords:** Silicon carbide; Silicon; Electromagnetic; Solar energy material

## 1. Introduction

With the recent development in photovoltaic industry, the need for solar-grade silicon has increased

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