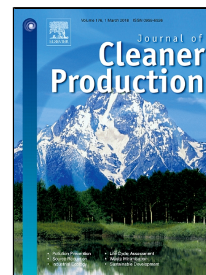


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An efficient method to separate silicon from high-silicon aluminum alloy melts by electromagnetic directional solidification

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1 **An efficient method to separate silicon from high-silicon aluminum**
2 **alloy melts by electromagnetic directional solidification**

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13 **Abstract**

14 In electromagnetic directional solidification, the silicon phase cannot
15 always be completely separated, resulting in considerable waste of power
16 and silicon. This study investigated the electromagnetic separation of
17 silicon by using electromagnetic induction-heated directional
18 solidification furnaces at varying frequencies. Two frequencies were
19 applied to separate silicon from **aluminum–silicon** melts. Numerical
20 simulation results indicated that a low frequency (3 **kHz**) could
21 substantially enhance the separation of **silicon** from **aluminum–silicon**
22 melts under an alternating electromagnetic field, which could increase the
23 speed of the melts to 0.92 cm/s. Experimental results showed that
24 separation efficiency could exceed 85% at a pulling rate of 10 $\mu\text{m/s}$ when

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