

Scrap Aluminium Purification

A method to remove iron contamination during aluminium recycling



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IP Status

Patent application submitted

Seeking

Development partner, Commercial partner, Licensing

About **University of Birmingham**

At the University of Birmingham our research leads to new inventions and fuels innovation and business growth.

Background

Iron contamination of aluminium alloys during recycling limits or prevents reuse of the aluminium in premium applications due to the loss of mechanical properties. There is a significant lack of effective methods to remove iron from aluminium alloys directly.

Tech Overview

Researchers at the University of Birmingham have developed a method to separate iron-enriched liquids from the molten aluminium alloys using a static magnetic field and a temperature gradient.

The aluminium alloy is placed within a temperature gradient (created by using two or more heaters with differing temperatures), wherein they form two regions: a partially melted region, and a fully liquid region. Applying a static homogeneous magnetic field to the molten alloys for an amount of time allows formation of an iron-enriched liquid layer at the interface between the two regions. The partially melted region will deplete from iron. The iron-enriched liquid layer can be removed directly by various methods (e.g. pouring, ladling or pumping) or by machining after solidification.

The construction of the apparatus shown schematically in **Figure 1** provides for at least two heaters to create a temperature gradient within the aluminium alloy material. The magnet is separated from the heaters by an insulating or cooling layer to prevent overheating of the magnet during operation.

The apparatus might be designed to incorporate a number of improvements or variations, e.g. (i) heaters can be round or tubular to encase the melting crucible; or (ii) the heaters and the magnets can be mobile to move along the elongated alloy samples within the crucible or (iii) the samples can be mobile and move alongside the stationary magnets and heaters. These improvements allow large quantities of alloy to be treated in the timely and efficient manner.

Benefits

- Environmentally friendly
- No requirement for a distinct iron containing phase to be present in the alloy
- Applicable to all types of aluminium alloys
- Does not contaminate the metal
- Scalable, with a flexible configuration that can be adapted to suit large-scale processes

Applications

The technology has the potential to be applied in aluminium recycling processing and aluminium fabrication, in particular for automotive, aerospace and other applications where recycled material is not currently used.

Opportunity

Seeking development partners and/or licensees.

ZSR1095

Patents

- PCT/GB2019/051967

Appendix 1

Figure 1

Schematic of apparatus for separation of iron from recycled aluminium alloys

