Impurity removal in aluminum alloys recycled from end-of-life vehicle scrap

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Abstract

The increasing aluminum content in light duty vehicles is generating growing volumes of end-of-life automotive scrap. Shredding of end-of-life vehicles produces Zorba, a non-ferrous scrap concentrate containing over 65% aluminum, which can be upgraded to Twitch material consisting of 90 to 98% aluminum. However, Twitch contains significant alloying elements including copper, iron, silicon and zinc that limit its recyclability. Currently these impurities restrict its use to downcycled non-structural cast alloys due to the stringent composition requirements of high value wrought and structural die cast products. With automotive aluminum scrap availability projected to supply 75% of United States auto body sheet demand by 2050, developing effective purification methods to remove residual elements from Twitch has become essential. This study examines the origins, composition and technologies for impurity removal to enable upcycling into higher value applications, thereby supporting a more circular and sustainable aluminum economy.

Keywords: Aluminum scrap, Aluminum recycling, Zorba, Twitch