

Processing of Al-Fe Scraps by Powder Metallurgy

Vojtěch Kučera, Filip Průša, Dalibor Vojtěch

Department of Metals and Corrosion Engineering, University of chemistry and technology Prague, Technická 5, 16628 Prague 6, Czech Republic. E-mail: kucerao@vscht.cz

Iron has a low solubility in aluminium solid solution even at elevated temperatures and forms brittle intermetallic phases with needle-like or platelets-like morphology when it is produced by conventional casting technologies. These phases have a detrimental effect on mechanical properties. Therefore with increasing significance of recycling and also amount of aluminium scrap that needs to be recycled, it is necessary to find a promising ways of processing such waste materials. Powder metallurgy leads to intensive microstructural refinement, increases solid solubility of alloying elements and overall to improvement of mechanical properties. Hence, it belongs to promising alternatives for processing aluminium materials with increased amount of iron. Aluminium alloy with 17 wt. % iron was prepared by centrifugal atomization and consolidated by spark plasma sintering followed by hot extrusion. The microstructure and phase composition of compact samples as well as mechanical properties were studied. Fine microstructure has been achieved by centrifugal atomization and consolidation by spark plasma sintering in combination with hot extrusion. Compression strength was 565 MPa with remarkable ductility reaching almost 35 %.

Keywords: AlFe alloy, centrifugal atomization, spark plasma sintering, hot extrusion

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