



# Aluminium EN AC – AlSi12 alloy matrix composite materials reinforced by $Al_2O_3$ porous preforms

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## ABSTRACT

**Purpose:** The purpose of this work is to elaborate the method of manufacturing of composite materials based on porous ceramic preforms infiltrated by eutectic aluminium alloy.

**Design/methodology/approach:** The material for investigations was fabricated by pressure infiltration method of ceramic porous preforms. The eutectic aluminium alloy EN AC – AlSi12 was used as a matrix while as reinforcement were used ceramic preforms fabricated by sintering of  $Al_2O_3$  Alcoa CL 2500 powder with addition of pore forming agents as carbon fibres Sigrafil C10 M250 UNS manufactured by SGL Carbon Group company. The observations of the structure were made on the light microscope and in the scanning electron microscope. EDS and XRD analysis of obtained composite materials have been also made.

**Findings:** The developed technology of manufacturing of composite materials with the pore ceramic  $Al_2O_3$  infiltration ensures expected structure and can be used in practice.

**Practical implications:** The composite materials made by the developed method can find application as the alternative material for elements fabricated from light metal matrix composite material reinforced with ceramic fibrous preforms.

**Originality/value:** The obtained results show the possibility of manufacturing the composite materials by the pressure infiltration method of porous sintered framework based on the ceramic particles with liquid aluminium alloy.

**Keywords:** Composites; Ceramic preforms; Infiltration

## MATERIALS

### 1. Introduction

Advanced light metal matrix composites have a potential for application as engineering materials in energy technology and in mobile or aircraft industry because of their low density, low cost and ease of fabrication. In recent years, much interest was focused on the use of  $Al_2O_3$  fibres or particles reinforced aluminium matrix

composite materials. The process for obtaining these composites include solid-state processes such as powder metallurgy (PM) [1-4], where metal and ceramic powders are blended and hot-pressed, and liquid-state processes such as melt infiltration, blending ceramic powder and molten aluminium and casting, melt stirring, pressurized infiltration and squeeze casting [5-10].

The infiltration of ceramic porous preform by a liquid alloy is a cost-effective method for the manufacture of metal matrix





