

MATERIALS SCIENCE AND TECHNOLOGY

CRT/DISAT - Dense Eutectic Ceramic Oxide By Additive Manufacturing: sustainable-by-design materials and technologies (ECOBAM)

Funded By	Dipartimento DISAT FONDAZIONE CRT CASSA DI RISPARMIO DI TORINO [Piva/CF:06655250014]
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Context of the research activity	The general objective of the project consists in finding new solutions for the production of Al₂O₃-based directionally solidified eutectic systems by Additive Manufacturing. Those systems have outstanding mechanical properties and thermal and microstructural stability which makes them ideal candidates at very high temperature (over 1600 °C) as structural materials in the aerospace industry. Dal 01/11/2024 al 31/10/2025 sul fondo PRIN 2022 PNRR: Progetto "Dense Eutectic Ceramic Oxide By Additive Manufacturing: sustainable-by-design materials and technologies (ECOBAM) - (CUP E53D23017820001)" finanziato dall'Unione Europea – NEXT GENERATION EU nell'ambito del PNRR M4C2, Investimento 1.1 "Fondo per il Programma Nazionale di Ricerca e Progetti di Rilevante Interesse Nazionale (PRIN)"- Bando PRIN 2022 PNRR del MUR (DECRETO DIRETTORIALE n. 1409 del 14 settembre 2022). Dal 01/11/2025 al 31/10/2026 sul PROGETTO "FIBRA-Studio e sviluppo di materiali d'attrito con fibre sostenibili" – PROGRAMMA PR FESR 2021/2027 DI FINPIEMONTE - BANDO SWICh 1° Call - CUP E13D23000840006
Objectives	The general objective of the project consists in finding new solutions for the production of Al₂O₃-based directionally solidified eutectic systems by Additive Manufacturing. Those systems have outstanding mechanical properties and thermal and microstructural stability which makes them ideal candidates at very high temperature (over 1600 °C) as structural materials in the aerospace industry. From the point of view of processing, oxide eutectic composite ceramics have been successfully produced by several directional solidification methods that, however, can not be used to obtain fine microstructure, large sample size and complicated shape. Additive Manufacturing has the potential to disrupt the ceramic industry by offering new opportunities to directly manufacture advanced ceramic components without the need for expensive tooling, thereby reducing production costs and lead times and increasing

design freedom producing defect-free, fully dense ceramic components. In particular, all the benefits that can be achieved by optimizing the AM process of dense ceramic materials place the project within the research theme 'Smart Industry and the development of new materials and processes with zero defects and zero waste', as the project is relevant in the context of the circular economy.

ECOBAM actions all entail savings of resources, in terms of energy as well of materials: improved performance components will be produced in shorter times and with lower energy consumption.

**Skills and
competencies
for the
development of
the activity**

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