

MATERIALS SCIENCE AND TECHNOLOGY

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

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584]
Supervisor	BONDIOLI FEDERICA - federica.bondoli@polito.it
Contact	PADOVANO ELISA - elisa.padovano@polito.it
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. PRIN 2022 PNRR 1838/2023 Dense Eutectic Ceramic Oxide By Additive Manufacturing: sustainable-by-design materials and technologies (ECOBAM) – CUP E53D23017820001 finanziamento dell'Unione Europea – NextGenerationEU – missione 4, componente 2, investimento 1.1., importo rendicontato € 49.088,97.
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	Material Science and Technology
--	---------------------------------