

MATERIALS SCIENCE AND TECHNOLOGY

MUR DM 117/BeDimensional - Development of two-dimensional materials for the conversion and storage of energy from renewable sources

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584] BEDIMENSIONAL SPA [Piva/CF:02389840998] Politecnico di TORINO [Piva/CF:00518460019]
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Context of the research activity	This PhD project is a cooperation between the research group of Prof. Teresa Gatti (Department of Applied Science and Technology) and the company BeDimensional S.p.A. (https://bedimensional.com/). The goal is to develop liquid formulations of two-dimensional materials to be used in devices for energy conversion and storage Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23002060004
Objectives	The proposed research programme, in agreement with PNRR objectives, is oriented towards the enhancement of applied research programs, through the synergy between universities and industry, to encourage technology transfer and innovation processes. The project is focused on the themes of sustainable energy , with special regard on use of renewable sources such as sunlight to obtain clean electricity and to store it for use on-demand. It is well aligned with the ambition of the NODES Ecosystem and its Spoke 2 on "Green Technologies and Sustainable Industries". In particular, the research aims at producing colloidal inks of 2D materials employing liquid-phase exfoliation methods in different liqui media, with particular emphasis on the use of non-toxic and environmentally friendly solvents. A complete characterization of the obtained nano-inks will be carried out in order to determine average size and morphology of the produced 2D crystals, as well as the physical and rheological properties of the colloidal dispersions. The 2D materials investigated will range from conductors to semi-conductors and insulators. The prepared inks will be

employed in more complex formulations for the integration in different types of energy devices, ranging from solar cells, to batteries, supercaps and fuel cells, often in collaboration with other partners.

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

Knowledge of synthetic chemistry and materials. Knowledge of chemico-physical characterization of materials and nanomaterials. Knowledge of colloidal chemistry and characterization of colloids. Knowledge of ink rheology. Knowledge of solution-processing methods (printing, coating, spraying).