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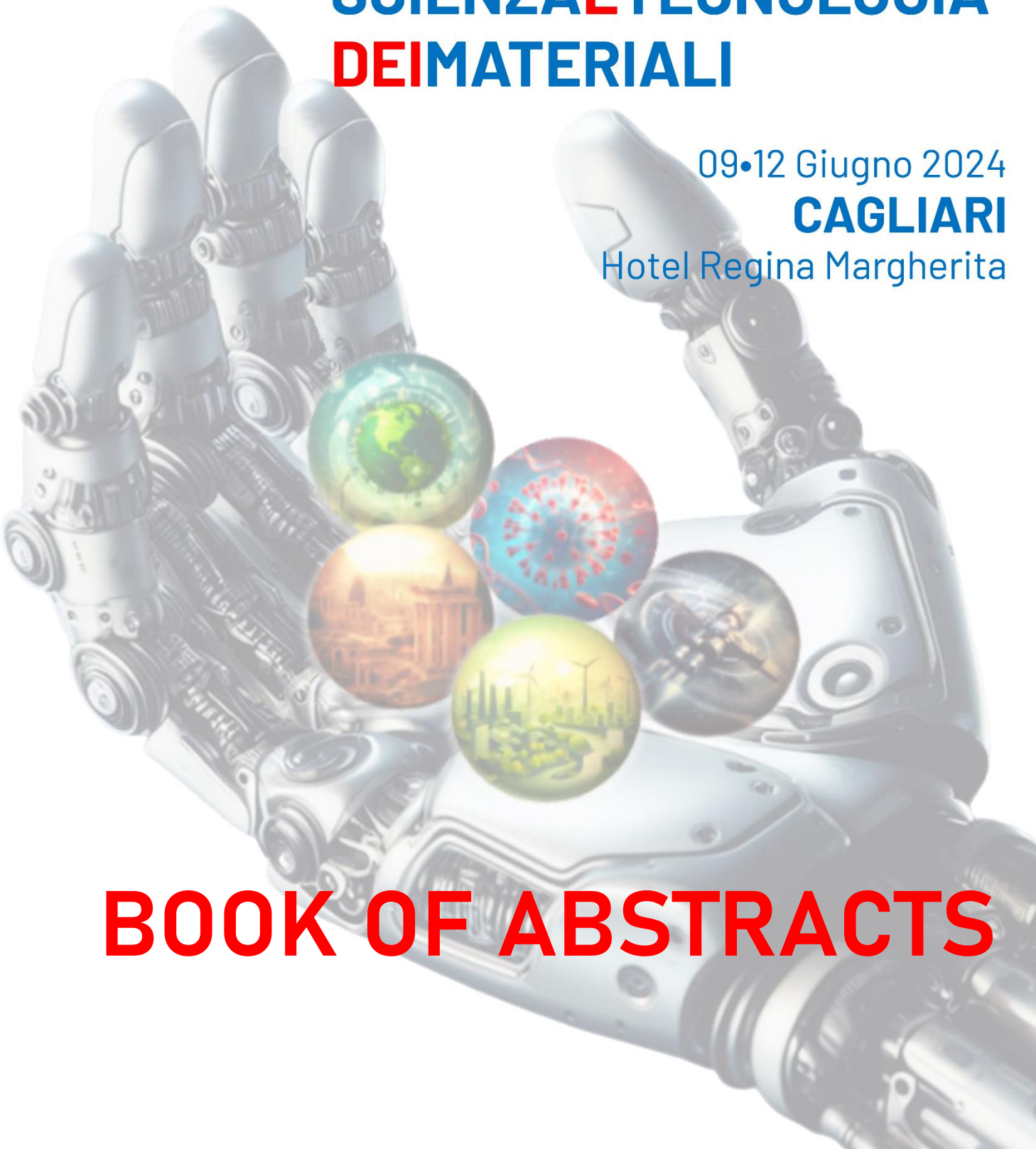

BOOK OF ABSTRACTS

3D-PRINTABLE LEATHER SCRAP-POLYMER COMPOSITE MATERIALS IN A CIRCULAR ECONOMY PERSPECTIVE

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Leather production is resource intensive, demanding substantial water and energy for tanning, often employing hazardous chemicals like chromium. These processes contribute disposal issues (e.g. for incineration) and harm ecosystems, with a significant carbon footprint from energy intensive stages. Synthetic alternatives are available on the market, but they are typically petrol base d and lack recyclability In this context, additive manufacturing, particularly Direct Ink Writing (DIW), offers a promising way to repurpose leather solid wastes from shavings as fillers in leather polymer composites, providing advantages such as rapid and cost effective material formulation, low energy consumption, and exceptional material versatility Leather wastes has been used as a filler for the formulation of polymer based, 3D Printable composite materials. On this basis, mimicking the properties of original leather is the first step for circular economy in leather industry.
UV and thermally curable resins have been employed as matrices, leading to the development of both rigid and flexible materials. Rheological behaviour has been investigated in order to quantify the printability of the formulations. Proper crosslinking and mechanical properties have been characterized in order to assess the suitability for the scope.
The composition based on a rigid resin has shown poor printability, due to the filler resin compatibilization process. However, the mechanical properties of cast composite sample are similar to the ones of the neat resin. The composition based on a flexible resin has shown good printability and higher mechanical properties with respect to the neat resin.
Leather solid wastes from shaving has been successfully used for the formulation of two 3D Printable leather polymer composites. Using a rigid matrix, the material shows poor printability, but neat resin mechanical properties have been preserved by adding up to 15% leather waste. Therefore, the material is suitable for casting applications. Using a flexible matrix, the material shows a good printability and higher mechanical properties with respect to the neat resin by using up to 51% leather solid wastes from shaving In addition, such material closely resembles virgin leather mechanical properties, paving the way f or a circular economy approach and the production customized items.

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