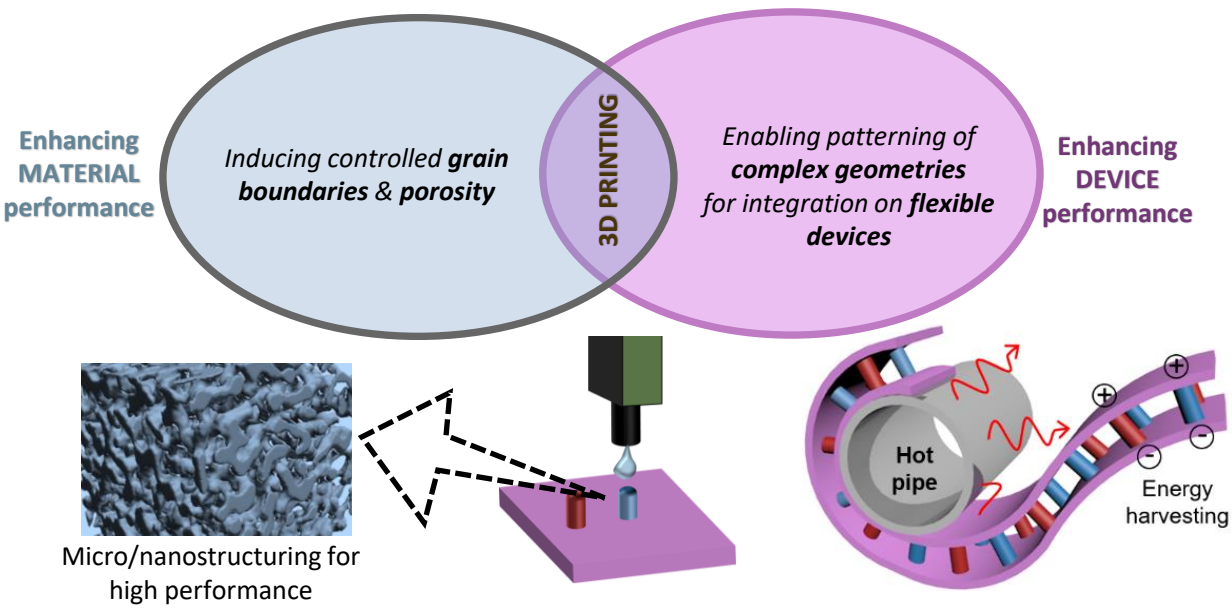
Enhancing the Performance of **3D-Printed Inorganic Thermoelectrics** by **Microstructure control** for **Energy Harvesting** Applications

More than 60% of the total primary energy is emitted to the environment, and most of this energy corresponds to heat waste. Thermoelectric (TE) generators are perfect candidates to recuperate part of this energy since they can transform heat waste into electrical energy. Compared to other harvesters, TE devices can continuously harvest energy in the absence of light and vibrations. Moreover, they are compact, light weight and portable solid-state devices with superior reliability because they do not involve moving parts. Despite the continuous increase in performance of TE materials, the cost-inefficient fabrication process of traditional TE generators along with their form factor limited to small and rigid devices, constrain their use to niche applications. In collaboration with **VITO**, **KU Leuven** proposes the development 3D printed thermoelectric materials for integration on thin and flexible substrates. VITO will develop the direct ink writing process of TE materials, which performance will be enhanced by microstructure control at KU Leuven. Most importantly, the cost efficiency offered by additive manufacturing and the versatility provided by flexible substrates able to conform to curved and large surfaces, will facilitate the widespread of these TE devices to those applications where performance is as important as cost, portability or easiness of installation.

This new technology can contribute to the decrease of the carbon footprint of industrial operations. Together with the industrial advisory board, we seek to evaluate the potential of this new class of TE generators to harvest the heat wasted in some of their industrial processes in an convenient and inexpensive way, define gaps and challenges and derive objectives for future collaborations.



Micro/nanostructuring for high performance