Master project: 3D Printing of magnetocaloric materials for sustainable and efficient cooling

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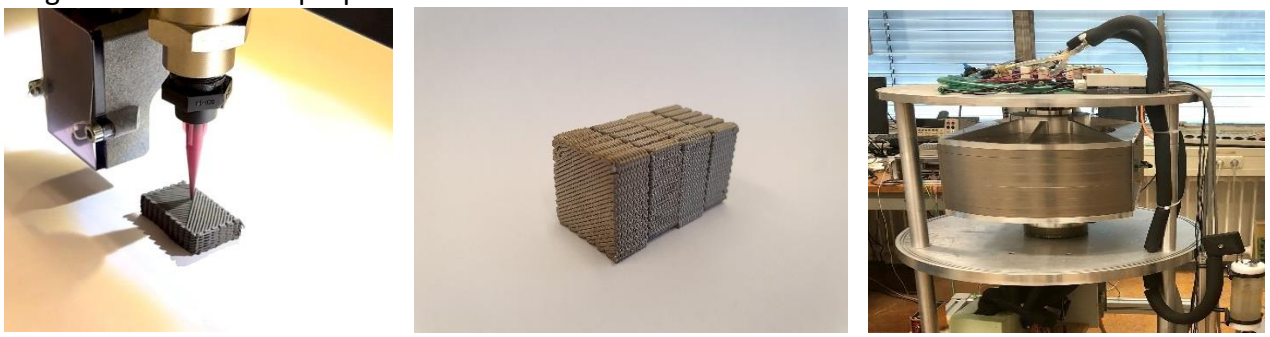
Introduction: In Magneto, we believe that we don't have to sacrifice our planet for our comfort or vice versa. Current heating and cooling are some of the biggest producers of greenhouse gas emissions. Our solution based on state-of-the-art magnetocaloric technology offers an alternative with zero greenhouse gas emissions and saves up to 30% of power consumption. Using cutting-edge additive manufacturing technology, we produce 3D printed materials for magnetocaloric heat pumps, which will revolutionize the cooling and heating industry and enable highly efficient, gas-free and sustainable refrigeration, air conditioning and household heating.

Goal: The goal of the proposed research is to explore state-of-the-art additive manufacturing technologies and post-processing steps to fabricate highly efficient 3D printed magnetocaloric materials. After 3D printing, the manufacturing process is finalized by heat treatment in the form of debinding and sintering. The aim is to design experiments to optimize the debinding and sintering steps for different geometries, which is crucial to achieve high performance materials and meet customer demands. Analyzing the effect of 3D printing and post-processing parameters on the final properties will be explored by measurements of porosity, mechanical strength, magnetic and thermal properties.



3D printed magnetocaloric material (left, middle) and magnetocaloric heat pump (right)

Tasks:

1. Optimization of the heat treatment process parameters and its effect on mechanical and magnetocaloric properties
2. Development of post-processing profiles (debinding and sintering) for 3D printed magnetocaloric materials with different geometries
3. Characterization of functional properties (mechanical strength, porosity, pressure drop, magnetic, thermal)

Your profile: We are searching for a creative, curious and responsible Student from the MSc Materials Science & Engineering or related fields (Mechanical engineering, Manufacturing engineering).
Knowledge in material characterization, manufacturing technologies, post-processing and heat treatments, pyrolysis, etc. Able to perform deep-dive into literature research and filter the relevant parameters for 3D-printing and post-processing.

Sounds like a great opportunity? Get in touch with us!