



MECHANICAL ENGINEERING STUDENT SEMINAR

Wednesday, September 14 2022 at 13:30, D. Dan and Betty Kahn Building, Auditorium 1.

Online: <https://technion.zoom.us/j/96918155025>

Powder Metallurgy based Additive Manufacturing of Shape Memory Alloys

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Shape Memory Alloys (SMA) are a group of metallic alloys with an ability for strain recovery through heating, or large strain recoverable deformation. The SMA currently available in the market are limited to several basic shapes. The demand for more versatile production methods in terms of geometry leads many research groups around the world to attempt producing SMA by Additive-Manufacturing (AM). However, current metal AM technologies are based mainly on processes that include local melting of the metal particles. This leads to inherent difficulties in controlling the final microstructure and properties of the AM SMA.

A proposed solution for obtaining better microstructure and shape memory properties from an SMA produced by AM is by using a “solid-state”, Powder-Metallurgy based process. In this process, the metallic powder is combined with an organic binder to create 3D printed parts, which undergo complementary de-binding and sintering to gain the final geometry and microstructure. In this work, the processing, thermal treatments, characterization, and thermo-mechanical testing of Ni-Ti (Nickel-Titanium) SMA samples produced using the Lithography-based Metal Manufacturing (LMM) method are presented. The AM samples displayed promising properties that include a recoverable strain of up to 2.3% with negligible plasticity under stress values as high as 800 MPa. In light of the obtained results, advantages, challenges, and recommendations for additional research will be discussed.

Note: the seminar will be given in Hebrew