



## PREMIO DI LAUREA “F. SOAVI” 2022

### Scheda sintetica tesi

Titolo tesi :- 3D PRINTING OF A NEW NiTi BASED SHAPE MEMORY ALLOY FOR ADVANCED IMPLANTS: PROCESSABILITY, FUNCTIONAL BEHAVIOR AND BIOLOGICAL TESTING

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Corso di Laurea Magistrale:- MECHANICAL ENGINEERING

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Università di appartenenza:- POLITECNICO DI MILANO

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Abstract del lavoro di tesi (massimo 1000 caratteri)

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The present thesis work reports an explorative study aimed to demonstrate the feasibility of 3D printing of a novel Shape Memory Alloy, integrating super-elasticity to antibacterial behaviour, for advanced implantable elements. Zn and NiTi powders were mixed and processed by Selective Laser Melting. The processability of the NiTiZn powder was study for defining the suitable process condition for maximizing the relative density up to 99.6% starting from the feasibility of the NiTi powder (Fig 1).

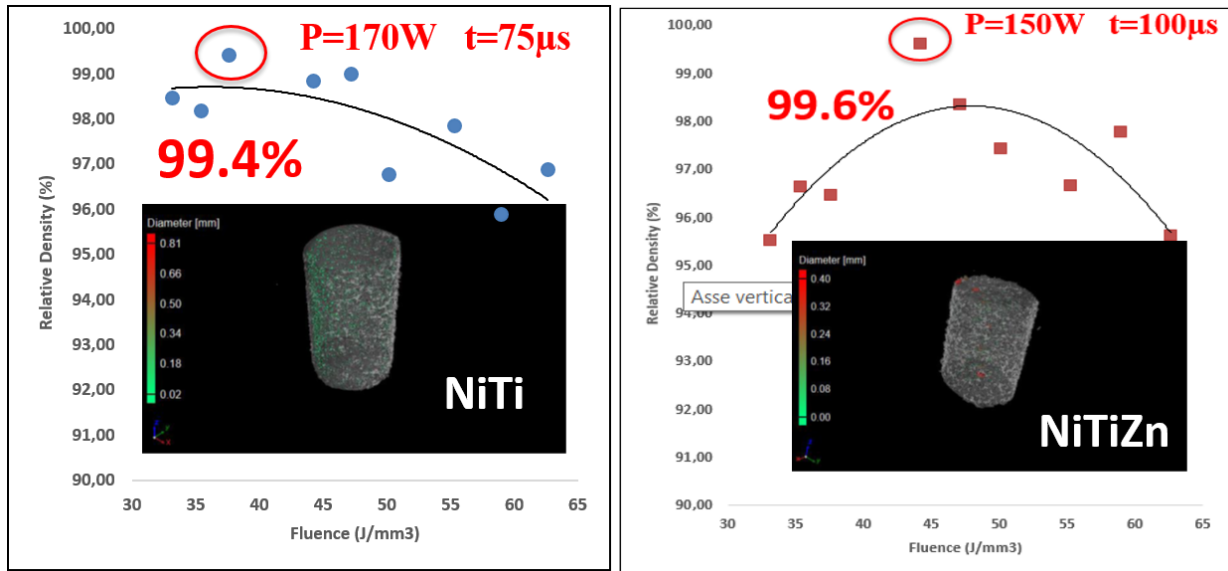


Fig 1: Process-ability map of the NiTi (on the left) and NiTiZn powders (on the right)

The superelasticity of the NiTiZn samples was demonstrated (Fig 2).

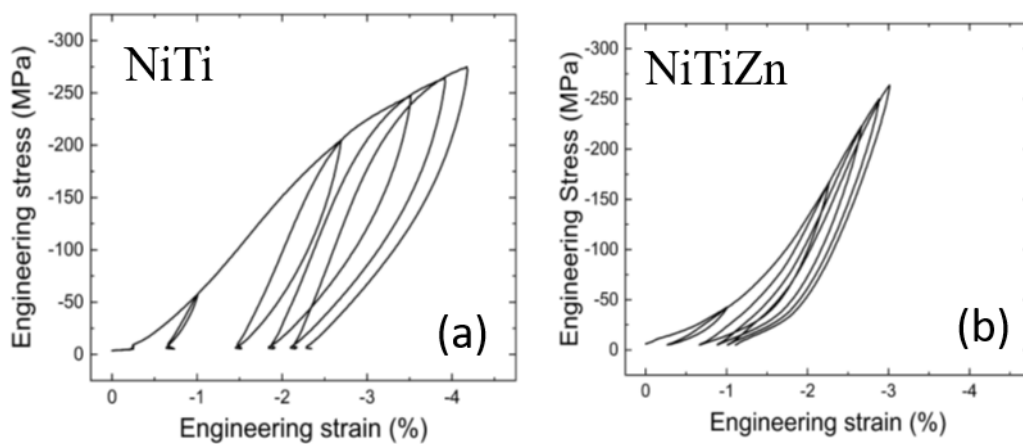


Fig 2: Super-elasticity of NiTi (a) and NiTiZn (b) samples

The antibacterial testing indicates that the presence of Zn can promote an antibacterial response after 6 hours (Fig 3), decreasing the number of bacterial colonies with respect to the initial condition (estimated about 93%).

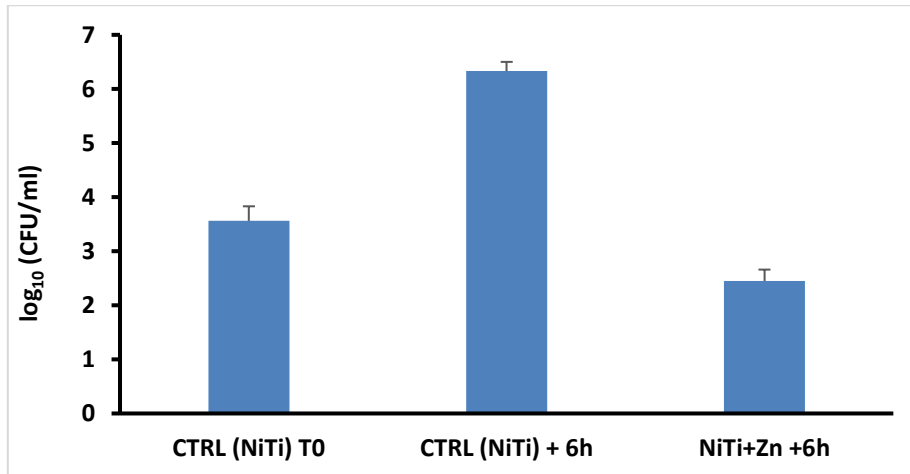


Fig 3: Antibacterial behaviour of NiTi and NiTiZn samples