L-Università ta' Malta

cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

BIODEGRADABLE IMPLANTS:

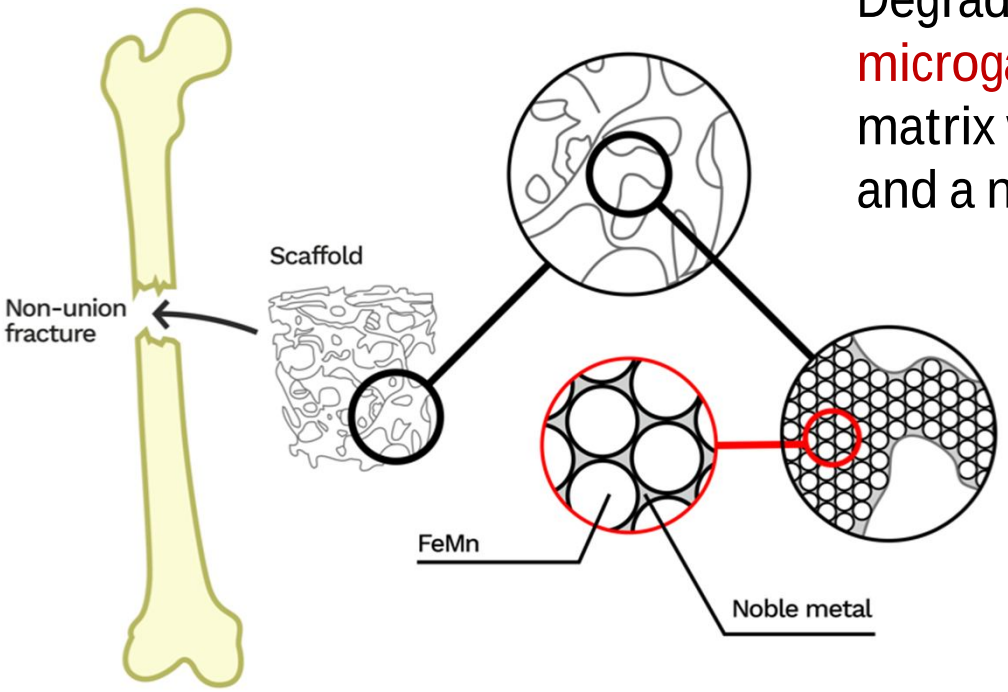
FE-MN-AG ALLOYS FOR BONE REGENERATION SCAFFOLDS

CHRISTABELLE TONNA

Supervised by Dr Ing. Joseph Buhagiar
Co-supervised by Dr Ing. Bertram Mallia

Department of Metallurgy and Materials Engineering
University of Malta, Msida, MSD 2080, Malta

Concept

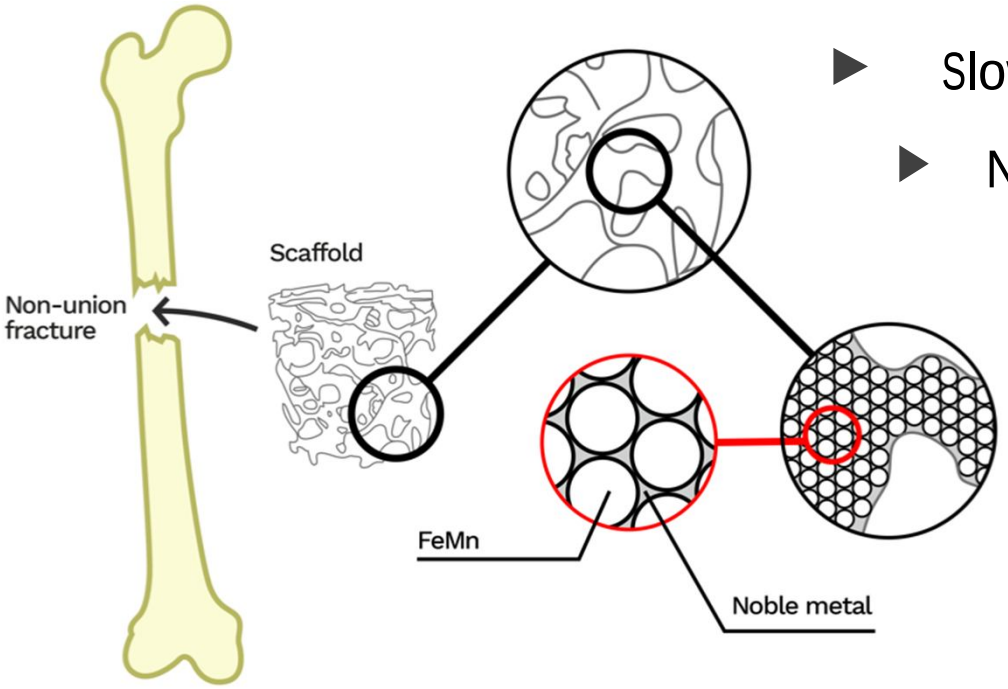


Degradation achieved through microgalvanic corrosion between austenitic FeMn matrix with low electrode potential and a noble metal

Control over degradation rate

- Varying wt. percent noble phase
- Varying volume of porosity / exposed surface area

Benefits



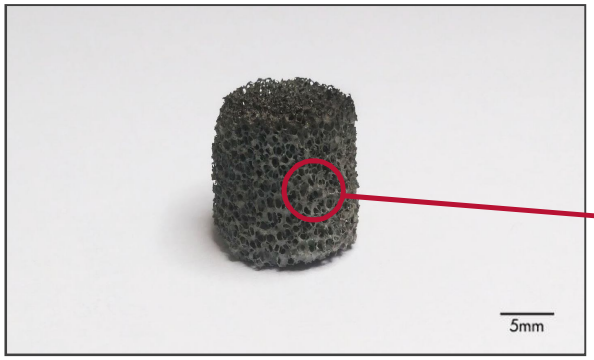
- Mechanically superior than polymeric scaffolds
- Slower degradation rate than Mg-based implants
- Non-magnetic (addition of Mn)
- Antibacterial properties (addition of Ag)
- Low cost

Potential Issue

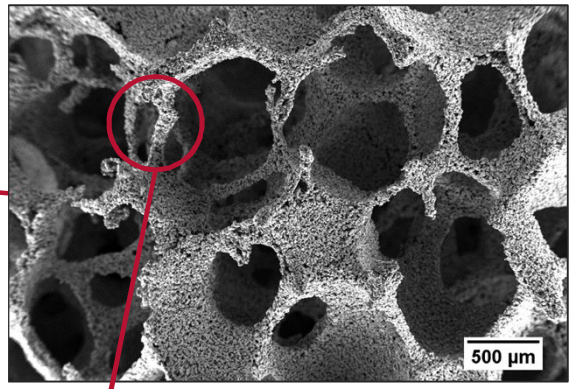
- Require agents to remove metallic ions *in-vivo*

Proof of Concept

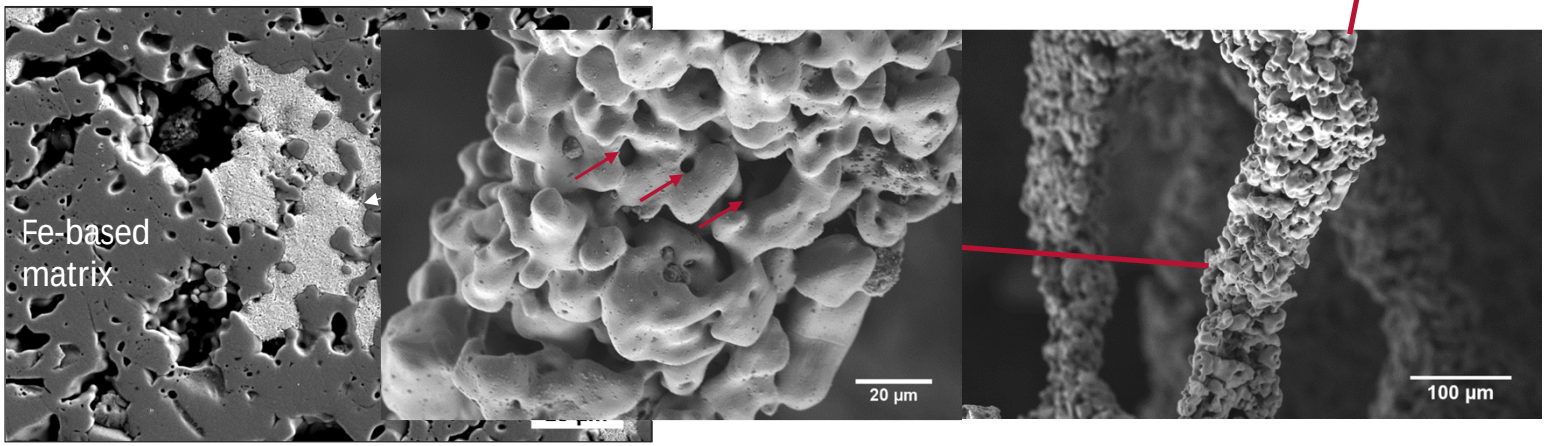
Polyurethane template replication using Powder Metallurgy



Fe-based foam



Interconnected porosity



Sintered foam strut