



# Improved 3D printed porous structures for better implants

April 2019 **Towards self-supporting, fully interconnected, porous 3D printed titanium implants**

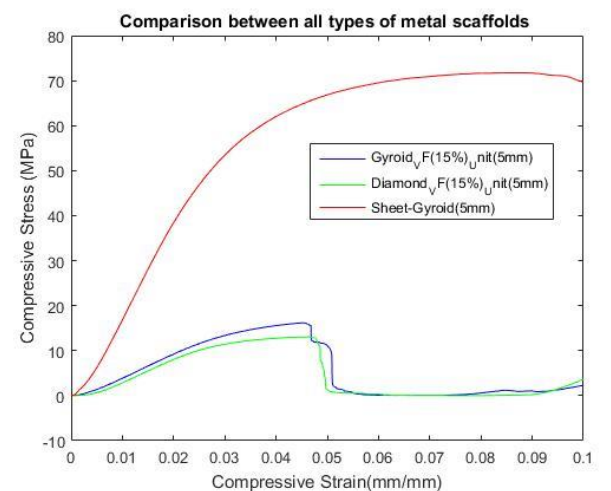
## Design of porous structures for 3D printing

- Triply Periodic Minimal Surfaces (TPMS) don't require support structures in 3D metal printing; they are self-supporting
- Design Gyroid and Diamond TPMS structures
- Design variations in strut size and cell size
- Full control over porosity and pore size
- No need to remove internal supports



## Mechanical testing of porous titanium samples

- Samples were subjected to axial compression
- ISO 3314:2011: Mechanical testing of metals - Ductility testing - Compression test for porous and cellular metals
- Mechanical properties (E-modulus ~500MPa-2,5GPa) are in the order of magnitude of human bone (E-modulus ~350MPa-17GPa)
- Mechanical properties can be fine-tuned by varying porosity



## Mimicing nature with porous titanium implants

With 3D printing we achieve 100% interconnected porosity. 3D printed porous implants allow ingrowth of human bone; the desired mechanical properties can be achieved by varying design parameters of the porosity.

