



PREMIO DI LAUREA “F. SOAVI” 2022

Scheda sintetica tesi

Laser Surface Texturing of Biodegradable pure Zn with short and ultrashort pulses: Material Characterization and Biodegradable Behavior

---

Carlo Alberto Biffi

---

Yeddula Venkata Prakash Reddy

---

Yeddula Venkata Prakash Reddy

---

Laurea Magistrale in Ingegneria Meccanica

---

Politecnico di Milano

---

Abstract:

The work concerns laser surface modification of biodegradable pure Zn for tuning the degradation for temporary implants. The material was laser textured with two types of pulse duration orders: nanosecond and femtosecond pulses for promoting fusion and vaporization, respectively. Parameters, like power and scan speed, were varied and their effect on the surface morphology was studied (Fig.1).

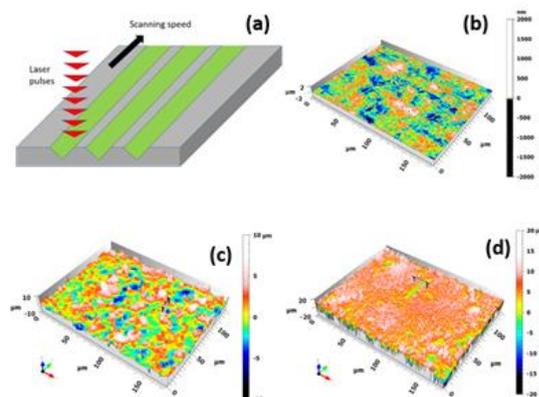


Fig 1: Schematic of the laser texturing (a); 3D-profilometry of polished (b) and laser textured surfaces, carried out at low (c) and high energy (d)

Immersion test in Hank's solution was carried out and the textured surfaces before and after degradation were analysed (Fig 2, left). Different degradation products were found (see XRD in Fig 2, right). It can be affirmed that laser texturing can be used for controlling the degradation of pure Zn.

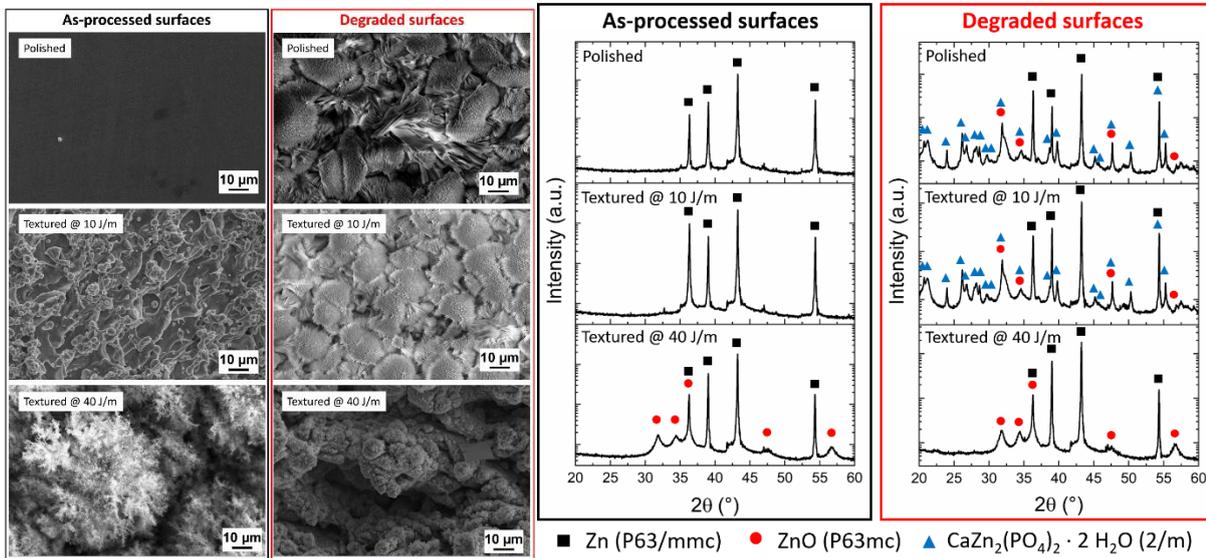


Fig 2: SEM images (on the left) and XRD patterns (on the right) of the polished and laser textured surfaces in the as-processed and degraded conditions