Photonic sintering of zinc metal for bioresorbable electronics

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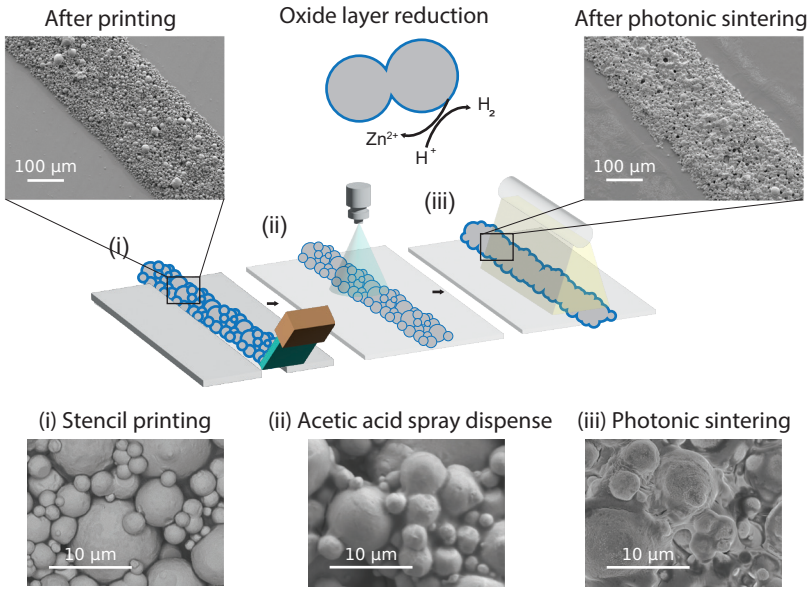
Reference: Fumeaux, N., and Danick Briand. "Zinc hybrid sintering for printed transient sensors and wireless electronics." npj Flexible Electronics 7.1 (2023): 14. doi.org/10.1038/s41528-023-00249-0

Abstract

Bioresorbable electronics have emerged in recent years as a promising concept for the developpement of a novel class of bioelectronic implants, which would allow for the temporary monitoring of physiological parameters, electric potentials or bioanalytes and subsenquently degrade in the body without harmful byproducts. Bioresorbable materials are challenging to process, largely due to their high reactivity and sensitivity to solvents and high temperatures. We leverage the use of additive manufacturing techniques for the scalable fabrication of pesonalizable transient implants . In particular, we introduce a novel sintering approach for the treatment of transient metal on temperature-sensitive bioresorbable, obtaining high-conductivity and durable metal interconnects.

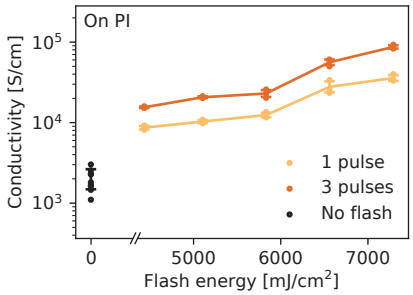
Fabrication process

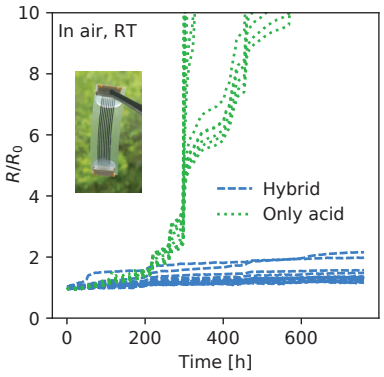
Hybrid sintering: acid-mediated oxide removal followed by pulsed-light sinterging.



Results

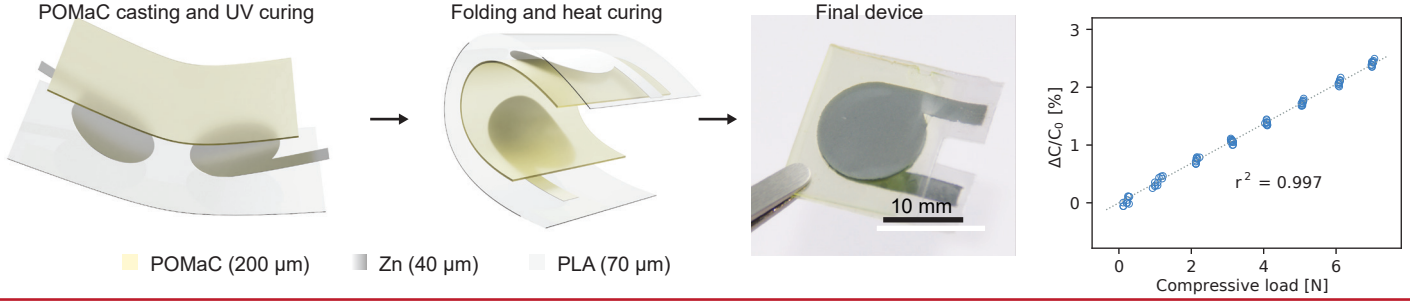
Highly conductive and shelf stable zinc electronics are obtained.





Application

Capacitive pressure sensors fabricated with additive manufacturing methods and leveraging a fully degradable elastomer (poly(octamethylene maleate (anhydride) citrate)).



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