A NOVEL APPROACH TO PROTEIN INSTABILITY

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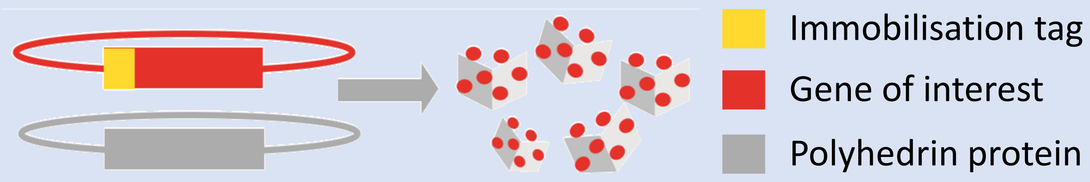
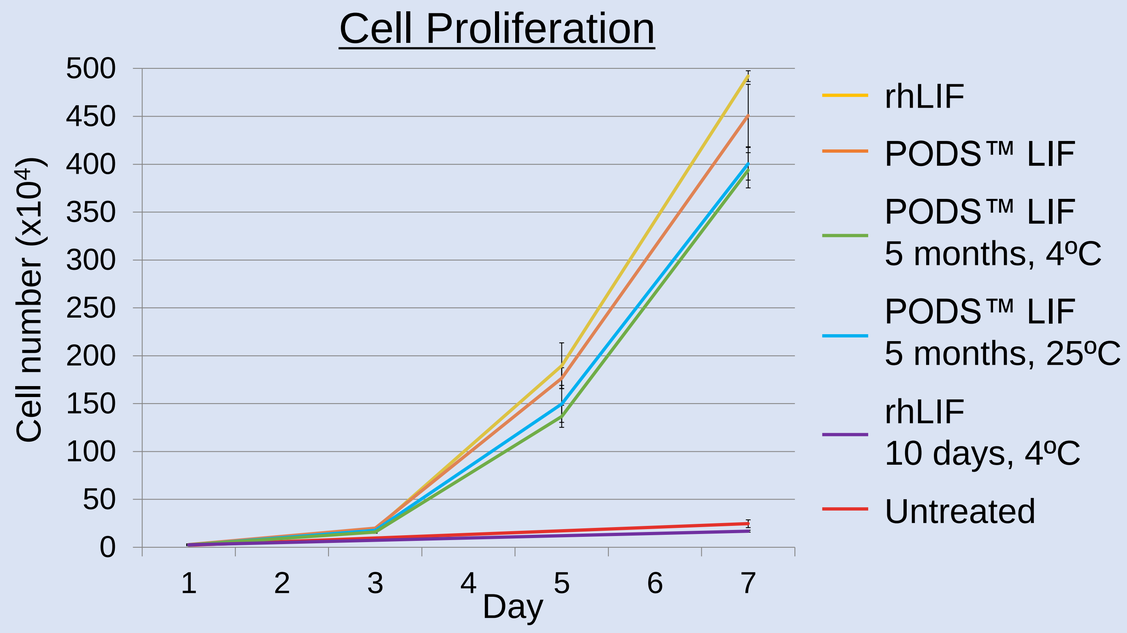
CELL guidance systems

Introduction

Recombinant growth factors are inherently unstable, with short half-lives limiting their utility in the lab and clinic. PODS™ (**PO**lyhedrin **D**elivery **S**ystem) are produced in cultured insect cells by co-expression of polyhedrin protein with a cargo protein. This encases and protects the protein of interest within a polyhedrin crystal. PODS™ crystals contain intact, native, and functional protein, are highly durable and extremely stable in storage, and degrade slowly over several weeks to steadily release active cargo protein. The sustained release mechanism of PODS™ growth factors can be used in many ways, e.g., to cultivate organoid cultures, create growth factor gradients or to functionalise surfaces and scaffolds.

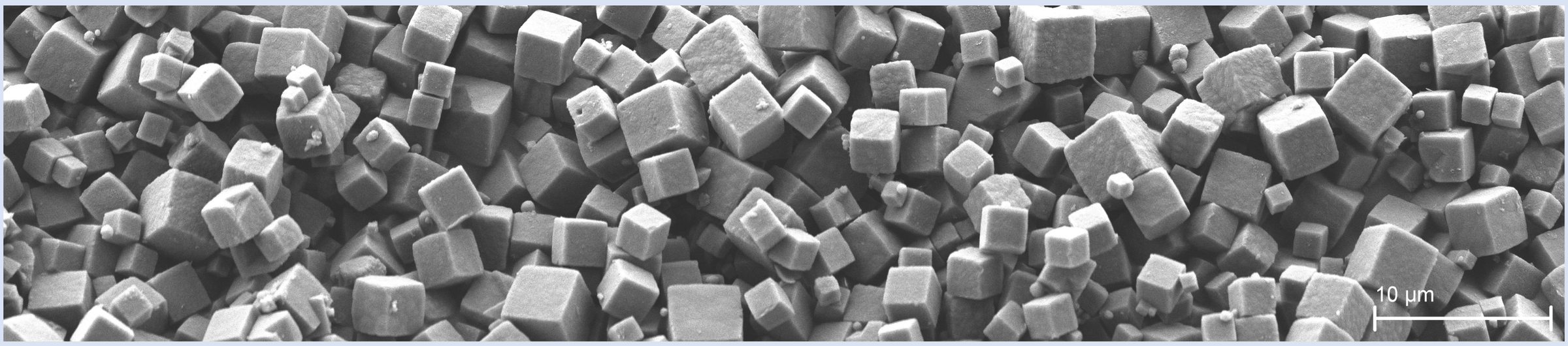


Long-term stability of PODS™



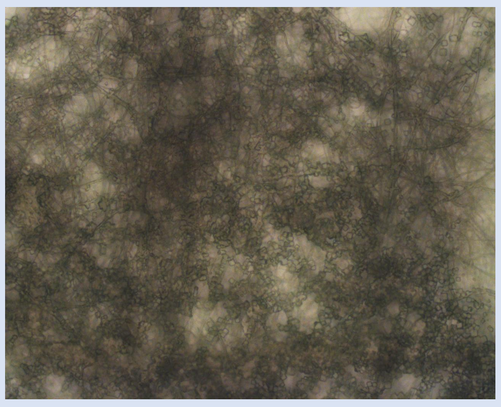
Proliferation of mouse embryonic stem cells was supported by PODS™ LIF, which were stored for five months at ambient temperature in assay buffer. In contrast, recombinant LIF (rhLIF) has no activity after storage for just ten days at 4°C.

Scanning Electron Microscopy

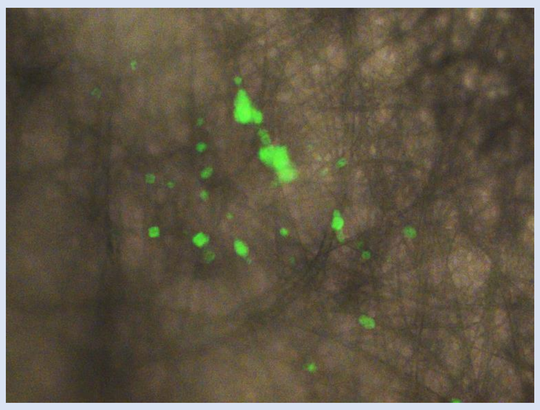


Functionalising biomaterials with PODS™

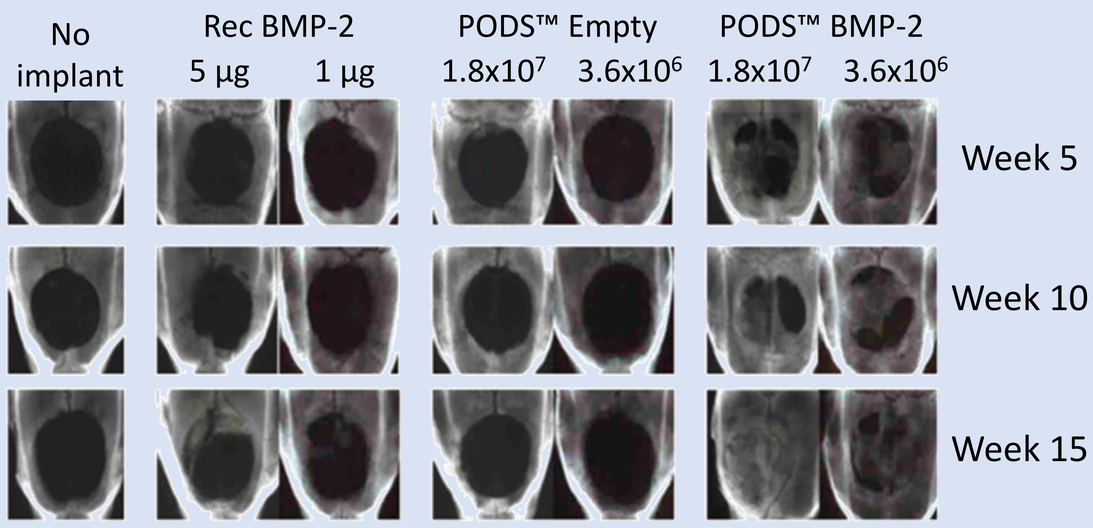
PLA + PODS™



PCL + PODS™ GFP



PODS™ have been successfully incorporated into biomaterials such as hydrogels, and poly(ε-caprolactone) (PCL) and poly(DL-lactide) (PLA) electrospun fibre sheets. Fluorescence microscopy of PODS™ GFP in PCL indicates that cargo activity is unaffected by incorporation.



An atelocollagen pad infused with rec BMP-2 or PODS™ BMP-2 was implanted into a 9 mm bone defect in rat calvaria. X-ray showed that PODS™ BMP-2 produced significantly more bone at 5, 10 and 15 weeks compared with rec BMP-2 or PODS™ Empty. Histology revealed that PODS™ were still visible at 12 weeks. No inflammatory reaction was observed.

Summary

- Over 70 PODS™ growth factors available.
- PODS™ deliver on long-term sustained release, by locking growth factors in a highly stabilised form.
- PODS™ protect cargo protein to generate high levels of efficacy from low, non-toxic doses.
- PODS™ can pattern surfaces or be incorporated into biomaterials, making it easy to functionalise scaffolds .

Scan to find out more about PODS™ growth factors