

## **William Macalester**

### **PhD Student**

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William graduated from the University of Bristol in 2017 with an MSci in Chemistry. For his final year project, he investigated the synthesis and self-assembly of amphiphilic block copolymers. Since joining the BCFN he has undertaken two short projects, exploring the use of optically addressable tools for transient microfluidics, and engineering swarm behaviours of nanoparticles. His PhD project, sponsored by GSK, aims to develop a novel functional in vitro model of a living human tooth to investigate the efficacy of antimicrobial treatments.

#### **“3D Bioprinting: Building a Human Bone-Dentin Interface”**

Periodontitis is a globally prevalent disease which may result in alveolar bone dissolution and ultimately tooth loss if left untreated. The use of mesenchymal stem cell (MSC) laden injectable hydrogels as an alternative to the established implant-based methods for periodontal tissue regeneration is a promising therapeutic approach, but still in its infancy. The periodontium provides a unique microenvironment for regeneration of bone and other connective tissues compared to other sites in the body, with features such as the presence of exposed dentine at the injection site. To investigate the effect of a dentine surface on the capacity for periodontal tissue regeneration by an MSC-laden injectable hydrogel, in vitro models exploring the development of an engineered bone-dentine interface were fabricated via 3D bioprinting.