

ICB PhD public presentations

# ENABLING INFORMATION IN MATERIALS AND THE ENVIRONMENT THROUGH SYNTHETIC DNA

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**Project Summary:** DNA is a powerful biological tool, which has a whole portfolio of functions that we as engineers can tap into. For instance, the ease of DNA replication through Polymerase Chain Reaction allows detecting down to one single molecule of DNA, which makes it a prominent candidate for environmental tracing. Part of this work established an ecotoxicological profile of sub-micron silica particles with encapsulated DNA, to enable further large scale tracer studies. Another tool at our hands is de-novo DNA synthesis, allowing us to control the sequence of nucleotides and therefore storing information. We used the same silica particle approach to create objects containing information, dubbed DoT (DNA of things). We have integrated DoT in additive manufacturing to create objects containing their blueprints and used polyacrylates to hide information in transparent objects. Finally, the silica particle platform has been extended with a thiol-functionalized particle, allowing for controlled degradation under biological conditions. This results in a stable data storage technology, which can be easily degraded if required, and has potential in environmental tracing too.

**CV.** Julian obtained his B.Sc. in Chemistry and Chemical Engineering and his M.Sc. in Chemical and Bioengineering from EPFL. In 2017, he started his doctoral studies in the Functional Material Laboratory.