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seminar

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Host: Prof. Aitziber L. Cortajarena

Overcoming the lack of functionality in bioresorbable polyesters: Towards bioactive polymeric devices for biomedical applications

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The physico-chemical and mechanical properties, as well as the degradation rate, of bioresorbable (co)polyesters can be finely adjusted by the specific combination of the available comonomers and the control over the synthetic conditions (e.g., reaction time and temperature, catalyst). The thermoplastic nature of the resulting (co)polymers allow their processing via both traditional (e.g., injection moulding, compression moulding) and advanced (e.g., electrospinning, 3-D printing) techniques, allowing the fabrication of polymeric devices that can mimic the native architecture of the extracellular matrix at the micro- and nanoscale. Despite their outstanding properties in terms of biodegradability and biocompatibility, most of the bioresorbable polyesters are considered bioinert and do not interact actively with surrounding cells and tissues, thus limiting their potential for therapeutic and regenerative purposes. In the Group of Science and Engineering of Polymeric Biomaterials (ZIBIO Group) we are actively exploring different strategies to overcome the limitations of bioresorbable polyesters by providing several functionalities. These include, among other, blending bioresorbable polyesters with active biomolecules and drugs to create amorphous solid dispersions (ASD), incorporating nanoparticles to provide advanced functional properties or decorating their surface with polymeric micro- and nanoreactors to perform enzymatic reactions. In the present work, a brief overview on these strategies is provided, together with particular examples where the resulting devices have been used in tissue engineering and other biomedical applications.