

## **Engineering Materials for the Biological Interface**

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Early biomaterial scientists quickly determined the importance in purposeful design of the interface of biomedical devices in eliciting a desired cellular response, including good tissue integration. Indeed, even with respect to biomedical design, the whole is greater than the sum of the parts; that is, the characteristics of a complex tissue are defined by the individual components as well as the relationship between the components. The biological interface, such as that provided by the connection of tendon or cartilage to bone, includes cell-cell and cell-tissue components; this transition can be modeled with cells and biomaterials to better understand both normal and repair tissue processes. The functionality of a biological interface may be judged by the response of biomaterials to cells or cells to biomaterials. Bulk tissue repair approaches, i.e. repairs of single tissue types, are relatively simple compared with repair of tissues across interfaces, where one must often consider very diverse tissue properties (e.g. varying tissue mechanics) and the corresponding interfacial interactions. In an attempt to simulate these interactions, researchers have focused on design of materials, control of cells, and design of bioreactors in which to grow and assess these systems.

This session will focus on the whole and the parts and the methods with which to integrate the two. The speakers represent academia and industry and will overview the technical concepts of interfacial engineering as well as the practical concepts and limitations regarding translation of ideas to commercial application. Helen Lu (Columbia University) will describe engineering tissue-to-tissue interfaces for the formation of complex tissues, David Schaffer (University of California, Berkeley) will cover identification and modulation of biophysical signals that control stem cell function and fate, and Matthew Gevaert (Kiyatec) will talk about cultivating 3D tissue systems to better mimic relevant events.