

Biomimetic tissue interfaces: design, modeling, and applications - Prof. M. Mirzaali, University of Delft

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Natural soft-hard tissue interfaces, such as those found between bone and cartilage or tendon, exhibit remarkable mechanical resilience and functionality. However, replicating these extreme interfaces in engineered systems presents significant challenges, primarily due to stress concentrations that lead to mechanical failure. In this talk, I will explore the fundamental design motifs that enable the durability and adaptability of natural tissue interfaces. I will discuss computational modeling approaches and optimization strategies for designing biomimetic interfaces, as well as fabrication techniques that translate these insights into functional materials. Finally, I will highlight potential applications, including the development of medical devices and in vitro models for guiding cell responses, with the ultimate goal of improving tissue integration and regenerative medicine.