

Biomimetic Surface Engineering: Where Do We Go From Here?

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Biomimetic interfaces have been designed to control both the adsorption of macromolecules and cell fate in the peri-implant region. Although successful performance of biomimetic interfaces has been frequent in the biotechnology and biosensor arena, translation of *in vitro* efforts into the clinical domain have largely failed. Lack of success can be attributed to complex *in vivo* microenvironments in the peri-implant region that encompass hypoxia, degradative molecules, and fibrin clot formation that can mask biomimetic surface engineering strategies. These microenvironments are not recapitulated using *in vitro* models, which leads to the poor efficiency of translational research. This lecture will emphasize the universal nature of biomimetic modification strategies and characterization modalities in the context of nanoscale polymer coatings that control the presentation of ligands for cell adhesion and subsequently cell fate determination. The limitations of this biointerface design approach for *in vivo* applications and current strategies for clinical success will be addressed.