Scientific Contributions: Photolithographic Patterning of Multiplexed Proteins

Study of the genesis of osteochondral tissue junction from mesenchymal stem cells requires patterning of multiple growth factors at micron-resolution. I developed a photosensitive hydrogel composite material stack assembly on a silicon wafer and used projection lithography to sequentially pattern proteins. This approach is innovative because current techniques to generate protein patterns cannot be accomplished at high-resolution and result in denaturation of proteins. This is significant because generation of physiological junctions from stem cells, compared to the use of adhesive or sutures, improve the quality of graft and its integration with individual tissues in vivo. Additionally, the process can also be used to mass-manufacture biosensors in a microfabrication foundry.

References


Schematic of the process leading to immobilization of antibodies on the silicon wafer surface. (Ref: Bhatnagar 2010).

Schematic of the process leading to multiplexing of immobilized antibodies on the photo-activatable hydrogel film immobilized on a silicon wafer surface. (Ref: Bhatnagar 2010).

Photolithographic multiplexing of mouse, rabbit and rat immunoglobulin antibodies immobilized on a photo-activatable hydrogel surface. (Ref: Bhatnagar 2010).