Nanocomposite Bio-Templates for Cell Culturing and Biosensing

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Abstract

Environmental monitoring, and more specifically biosensing (e.g., of air and water quality, pollutants, toxins, pathogens, among others), remain challenging due to the wide variety of simultaneously occurring complex chemical and biological species. However, recent advances in nano- and biotechnology have enabled the design of novel nanocomposites capable of selectively isolating and identifying specific biochemical targets of interest. In this study, a layer-by-layer self-assembly technique is employed for the fabrication of carbon nanotube-enhanced polymeric bio-templates for direct cell culturing and biosensing. Through judicious selection of nanocomposite constituents and precise control of the thin film's nano- and micro-structure, the composite is tailored to serve as a bio-template that exhibits specific affinity towards environmental electrophilic or thiol-reactive stressors. A variety of bacteria are directly cultured onto thin film surfaces to demonstrate their compatibility with the proposed nanocomposite. In addition, the concentration of bacteria colonies present on film surfaces can be monitored by measuring corresponding variations in thin film conductivity.

Bibliography

Dr. Kenneth J. Loh is an Assistant Professor in the Department of Civil & Environmental Engineering at the University of California, Davis. He received his B.S. degree in Civil Engineering from Johns Hopkins University in 2004. He continued his graduate studies at the University of Michigan where he completed his M.S. degree in Civil Engineering in 2005, a second M.S. degree in Materials Science & Engineering in 2008, and the Ph.D. degree in Civil Engineering in 2008. His research interests include the development of multifunctional nanocomposites and biologically-inspired materials for sensing, actuation, and power harvesting applications.