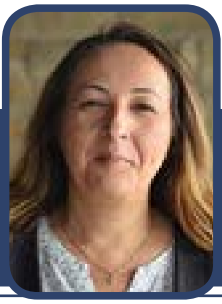
Candan Tamerler, Expert Opin Environ Biol 2018, Volume: 7
DOI: 10.4172/2325-9655-C5-031



Candan Tamerler

University of Kansas, USA

Precision biomolecular assembly at the bio-nano interfaces towards functional hybrid materials

Bio-Nanomaterial interfaces and surfaces is one of the most rapidly expanding fields that is dynamic across the disciplines from engineering to life sciences. All solid material systems have boundaries, of which the properties are different from bulk material at the nanoscale. How these "in-between regions" merge into one another becomes a critical challenge, and also a fascinating question, which has moved to the forefront in the development of new technologies ranging from biomedical to energy production. Biological materials provide the inspiration for harnessing design strategies to develop innovative materials that simultaneously self-assembled, self-organized and self-regulated; characteristics that are intricate to achieve in purely synthetic systems. Proteins play an essential role in fabrication of biological materials due to their diverse functions ranging from structural to biochemical. The ability to mimic any of these functions can be a game changer in designing new class of biologically functional materials and devices. Molecular recognition guides the interfacial interactions in biological materials. Recognizing this, our group has been exploring the smaller protein domains, i.e. peptides as the key fundamental building blocks to mimic the molecular recognition at the solid material interfaces. Our approach includes decoding the peptide-material interactions and utilizing them in the precision assembly of abiotic/biotic materials. Building upon the modularity of protein domains, we further engineer these material selective peptide based building blocks to incorporate additional functions as multifunctional chimeric molecules ranging from short peptide chimera to recombinant fusion proteins. Armed with an extensive array of multifunctional molecular units, we tackle different technological areas built upon the self-organized biomolecular-solid interfaces. Presented specific examples will include biofunctionalization of surfaces with bioactive as well as bio-repulsive attributes, protein/peptide based hybrid nanoassemblies for targeting and sensing, nanofibers that are integrated with fluorescence proteins and nanoparticles pairs and bioenabled mineralization.

Biography

Candan Tamerler is Wesley G. Cramer Professor in Mechanical Engineering and Bioengineering at the University of Kansas. She is the Director of Bio-mediated and Biomimetic Materials at the Institute for Bioengineering Research. Prior to KU, Tamerler was Professor at the Materials Science and Engineering at the University of Washington (UW) and served as an Assistant Director of the Genetically-Engineered Materials Science & Engineering Center. Prior to UW, she worked at the Istanbul Technical University, where she was Professor and the Chair of Molecular Biology and Genetics Department. Combining the molecular biology to materials science, His research focuses on engineering biomolecular systems for design, synthesis and biofabrication of materials in wide range of applications. With more than 150 publications and several patents, her publications received >6000 citations (H-Index: 38). He is a Fellow of the National Academy of Sciences- Turkey and the American Institute of Medical and Biological Engineering (AIMBE).

ctamerler@ku.edu