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Pattern-Generating Fluorescent Molecular Probes for Chemical Biology

Leila Motiei[1], David Margulies[1]
[1]Department of Organic Chemistry, Weizmann Institute of Science, Israel

Abstract

Fluorescent molecular probes have become a powerful tool in protein research. However, these probes are less suitable for analyzing specific populations of proteins in their native environment. In this talk I will give an overview of a new class of fluorescent molecular probes [1-6] that we have developed in recent years, and show how they can be used to detect individual proteins, protein combinations, as well as binding interactions and dynamic changes that occur on their surfaces. In the second part of this talk, I will describe a new class of fluorescent molecular sensors that combines the properties of small molecule-based probes cross-reactive sensor arrays (the so-called chemical nose/tongue').[6] On the one hand, the probe can detect different protein families by generating unique identification patterns, akin to the cross-reactive arrays. On the other hand, its unimolecular structure and selective binding allows identifying combinations of specific protein isoforms in complex mixtures and inside living cells, where macroscopic arrays cannot access.

Keywords: fluorescent molecular probes, cross-reactive sensor arrays, proteins, biosensing

Biography:

Leila Motiei obtained her M.Sc. in Chemistry from Bar-Ilan University, Israel in 2003. She then moved to the Scripps Research Institute in La Jolla, CA where she worked with Prof. M. Reza Ghadiri as a research assistant (2004–2006). Her research involved the study of antibacterial cyclic D,L-α-glycopeptides. In 2007, she returned to Israel to conduct her Ph.D studies at the Weizmann Institute of Science under supervision of Prof. Milko E. van der Boom studying the exponential formation of molecular-based assemblies. Since 2012, she has been a staff scientist in the group of Dr. David Margulies at the Weizmann Institute of Science. Her research interests focus on chemical biology especially on molecular recognition and biosensing.

Speaker Publications:

1. Decorating bacteria with self-assembled synthetic receptors; December 2020Nature Communications 11(1); DOI: 10.1038/s41467-020-14336-7

2. Glycoform Differentiation by a Targeted, Self-Assembled, Pattern-Generating Protein Surface Sensor; August 2020Journal of the American Chemical Society XXXX(XXX); DOI: 10.1021/jacs.0c05644

3. Molecular Logic as a Means to Assess Therapeutic Antidotes; April 2019Frontiers in Chemistry 7; DOI: 10.3389/fchem.2019.00243

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