CiQUS

Centro Singular de Investigación en Química Biolóxica e Materiais Moleculares

Conferencia: E-DNA: The “pata negra” of biosensors

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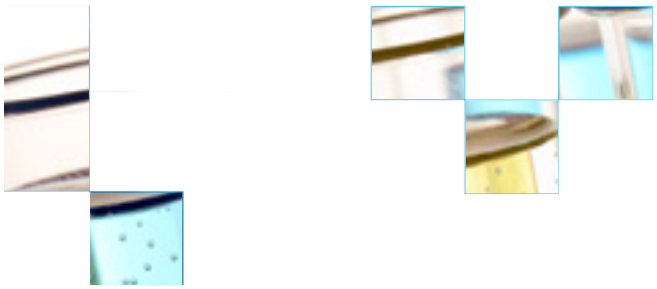
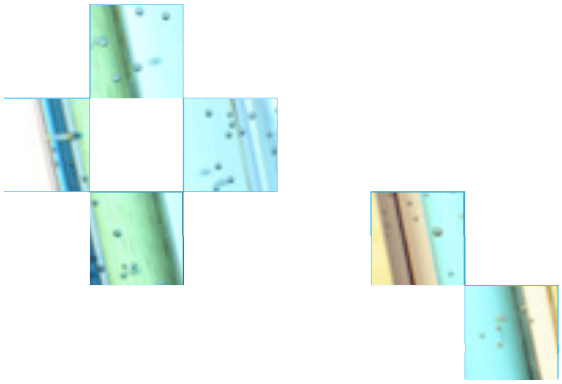
Aula de Seminarios do CIQUS

10:00 h

Máis información:
www.usc.es/ciqus





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Area of Emphasis:

Biochemistry

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Prior to joining the University of California at Santa Barbara in 1998 Dr. Plaxco received his Ph.D. from Caltech and performed postdoctoral studies at Oxford and the University of Washington. Dr. Plaxco has co-authored more than 130 papers on protein folding, protein dynamics, folding-based biosensors and folding-based smart materials. He has also co-authored a popular science book on Astrobiology and numerous patents. He is actively involved in the commercialization of the novel technologies emerging from his laboratory.

Research Objectives

Biomolecular recognition is versatile, specific and high affinity, observations that have motivated decades of research aimed at adapting biomolecules into a general platform for molecular sensing. Despite significant effort, however, these so-called “biosensors” have almost entirely failed to achieve their potential as reagentless, real-time analytical devices; the only quantitative, reagentless biosensor to achieve commercial success to date is the glucose sensor employed by millions of diabetics. The fundamental stumbling block that has precluded more widespread success in the biosensor field is the failure of most biomolecules to produce any easily measured signal upon target binding –that is, biomolecules typically do not change their shape or dynamics, or emit light or electrons when they bind their recognition partners. Because of this, it has proven difficult to transduce biomolecular binding events into a measurable output signal that is not readily spoofed by the binding of any of the many interferrents present in realistically complex samples. In recent years, however, we have developed a potential solution to this problem based on the binding-induced “folding” of protein and nucleic acid-based receptors. These folding-based sensors are rapid (responding in seconds to minutes), sensitive (detecting sub-picomolar to micromolar), reagentless, and have already been generalized to a wide range of specific protein, nucleic acid and small molecule targets. Moreover, because their signaling is linked to a binding-specific change in the physics of the probe biomolecule –and not simply to adsorption of the target onto the sensor head- this platform is selective enough to be employed directly in blood, soil, cell lysates and other grossly contaminated clinical and environmental samples. Indeed, we have recently demonstrated their ability to quantitatively monitor a specific small molecule in real-time directly in the blood of living, anesthetized animals. Because of their sensitivity, substantial background suppression and operational convenience, these folding-based biosensors appear potentially well suited for electronic, on-chip applications in pathogen detection, proteomics, metabolomics and drug discovery.