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Review Article

Quartz Crystal Microbalance as a Sensor to Characterize Macromolecular Assembly Dynamics

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Abstract

The quartz crystal microbalance sensor has a resonant frequency f and a quality factor Q which can be used to probe the properties of nanometer thick film loads. A recent review by Arnau (2008) has discussed many of the considerations necessary to accurately probe for these properties. To avoid needless duplication but to still provide an adequate background for the new user, we briefly outline the basic measurement methodologies and analytical techniques that were covered in the review. Details will be provided on some specific perspectives of the authors. For example, the special precautions necessary when dealing with soft films (polymeric and biological) under liquid are overviewed. To illustrate applications of the QCM technique, simple bilayer and vesicle behaviors are discussed, along with the structural transformation resulting from protein adsorption onto an intact vesicle adlayer. The amphipathic α -helical (AH) peptide interaction is given as a particular example. Lastly, we summarize a top-down approach to functionalize a surface with a cell membrane and to study its interaction with proteins.

Abstract

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