

Use of Quartz Crystal Microbalance with Dissipation (QCM-D) for investigating Nanoparticle-Platelet Interactions



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Quartz Crystal Microbalance with Dissipation monitoring (QCM-D) technology was initially developed by Rodahl and Kasemo in 1996. Since then, this technique has been widely used and its potential applications and the number of scientific reports have increased dramatically, especially during the last ten years.

Using this technology, two parameters (frequency Δf and dissipation ΔD) can be monitored simultaneously in real-time as deposition takes place on a quartz sensor. In fact, QCM-D is a very sensitive and useful analytical tool for monitoring and characterizing mass deposition on different surfaces [[www. biolinscientific.com](http://www.biolinscientific.com)].

Engineered nanoparticles (NPs) have become very attractive for their use in industry and in the medical field. Although NPs can enter the body through various portals, their systemic distribution depends on their interactions with different blood components. It has been demonstrated that NPs can activate platelets in vitro and induce vascular thrombosis in vivo.

Given that the use of engineered NPs is growing and humans are being increasingly exposed to these particles, their compatibility with blood platelets should be carefully evaluated. QCM-D is able to detect the formation of platelet micro-aggregates that precede the generation of larger platelet thrombi in real-time and under flow conditions. In fact, NP-induced platelet aggregation can be detected using QCM-D at NP concentrations that are undetectable by flow cytometry and light transmission aggregometry (well-established methods for the measurement of platelet function).

BIOGRAPHY AND RESEARCH INTERESTS

Dr. María Santos-Martínez is a Spanish medical doctor, specialist in Respiratory Medicine (Universidad Autónoma de Barcelona, Spain). She started her training as basic researcher in Houston-Texas (USA) in 2004. In 2006 she moved to Ireland and defended her PhD in 2009 (Trinity College Dublin). She is an Assistant Professor (Ussher) in Nanopharmaceutical Drug Discovery in TCD from 2010.

Her research interests are focused on platelet biology, cancer, Nanotoxicology (particularly on nanoparticle-cell and nanoparticle-platelet interactions) and applications of nanotechnology to study the interactions of nanoparticles developed for drug delivery with their targets and the potential barriers that they have to overcome to exert their action.

PUBLICATIONS

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