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Electrochemistry of Dynamically Dissolving Droplets

Gold-electrode electrochemistry tracks sub-nL droplet dissolution of drugs, nanoparticles, or heavy metals faster and cheaper than microscopy methods.

Purdue researchers have developed an electrochemical method for monitoring droplet dissolution. Current methods of droplet dissolution detection include AFM, DLS, and optical microscopy. These measurements can be costly, slow, and resolution-limited. The Purdue method contemplates a device in which a gold electrode detects the analyte of interest that is dissolving in an aqueous phase, with the aqueous phase connected to a second electrode. The method can be used detect sub-nL volumes due to the requirement that only one electrode needs to be in contact with the droplet. Using cyclic voltammetry, the method detects pre-concentration of the analyte as a droplet in the aqueous phase and droplet dissolution in the aqueous phase. This method may track dissolution of nanoparticles, heavy metals, or pharmaceuticals.

Technology Validation: The method successfully tracked dissolution of Kanamycin using square wave voltammetry.

Advantages:

- Sub-nL limit of detection

- Inexpensive, fast platform

Applications

- Tracking dissolution of nanoparticles, heavy metals, and pharmaceuticals

TRL: 3

Intellectual Property:

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Technology ID

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Category

Energy & Power Systems/Energy Storage
Materials Science & Nanotechnology/Nanomaterials & Nanostructures
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