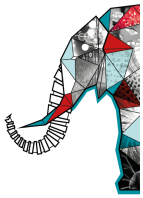
25e Congrès Général de la Société Française de Physique



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Challenges and opportunities in transmission electron microscopy for revealing the fate of inorganic nanomaterials in the body

The development of safe and efficient nanomaterials for biomedicine requires understanding their life cycle in the body. In that regards, transmission electron microscopy (TEM) provides the unique opportunity to study at the atomic scale what happens to nanomaterials when they are injected in vivo. Combined with global magnetic and elementary analyses, the multi-functionalities of TEM allow revealing the biodistribution, the biotransformation and recycling processes of nanostructures at the organ and sub-cellular levels. We have applied this multiscale approach to many promising nanomaterials for biomedical applications, including magnetic, plasmonic and graphitic nanostructures.[1-4] Through an overview of these studies, we want to highlight the possibilities and challenges in TEM for revealing the fate of inorganic nanomaterials in the organism. In particular, we will show the great potential of liquid-cell TEM to establish the link between the atomic structure and the degradability of nanomaterials which is essential if one want to modulate their life cycle of in the body.[3] The challenge of studying the interactions between biological species and nanomaterials directly in physiological media with liquid-cell TEM will also be discussed.[5]

[1] Lartigue et al. ACS nano 7, 3939, 2013
[2] Kolosnjaj-Tabi et al. ACS Nano 9, 7925, 2015
[3] Elgrabli et al. ACS Nano 9, 10113, 2015
[4] Volatron et al. Scientific Report 7, 40075, 2017
[5] Piffoux et al. Nanoscale 10, 1234, 2018

Choix de session parallèle

6.2 Techniques couplées et analyses multispectrales dans le domaine des matériaux

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Classification de Session: Séance Poster