

Tytuł projektu: „Effect of nanoparticles on membrane fusion”

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Multifunctional nanoparticles (NPs) have been widely used in biomedical applications due to their size, unique physical properties, and functionality. In these applications, it is ubiquitous that the NPs are exposed to biological media and come into intimate contact with cells. There is currently an urgent need to bridge the gap in our knowledge of NP toxicity in order to fulfil the potential of nanomaterial application. Such an understanding is also critical to the public perception of the safety of nanomaterials. A key step in direct nanotoxicity is the nanoparticles crossing the cell membrane, often by endocytosis, a membrane fusion process. However, little is known how NPs affect the mechanism of membrane fusion, specifically, how the presence of NPs lower the energetic barrier in the membrane fusion process. Funded by the Marie Skłodowska-Curie Actions programme, the project will to measure, using the surface force apparatus (SFA), *in situ* and *in real* time, interactions and fusion between model membranes (i.e. supported lipid bilayers) in the presence of NPs and as a function of lipid compositions and physicochemical properties of NPs. Direct visualisation of membrane contact in the SFA allows the role of NPs in the spatiotemporal structural evolution of membrane fusion, as the membranes engage in contact, compression, adhesion and fusion. These measurements will lead to unprecedented results, shedding light on the fundamentals of NP-mediated membrane fusion, relevant to our understanding of how NP gain cellular entry.