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CIC biomaGUNE
CENTER FOR COOPERATIVE RESEARCH IN BIOMATERIALS

seminar

Tuesday, 15th January, 12.00 pm, Seminar Room

Host: Prof. Luis M. Liz-Marzán

Nanoparticles Interactions with Viruses: From Stabilization to Virucidal Drugs

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Viruses kill every day in large numbers especially in low-income countries. Any given day ~1600 children age 1 to 5 die of diarrhea (mostly due to rotavirus). More than 5000 people have died of Ebola in the last outbreak. On the other hand, viruses also save lives as vaccines; unfortunately, because of their thermal instability, vaccines need constant refrigeration. This generates a 'cold chain' need for vaccines that contributes to >50% of the costs of vaccination programs and generates significant logistic problems especially in developing countries. The 'cold chain problem' is considered among the top challenges for global vaccinations. In this talk, these problems will be addressed with the tools of nano-medicine. Results show that nanoparticles (and equivalent small or macro-molecules) can have a wealth of interactions with viruses. Depending on the particles' coating and on the specific virus, particles can (i) thermally stabilize viruses, (ii) inhibit their cell entry, or (iii) be virucidal (i.e. permanently in-activate them outside their host). Each of these interactions can be leveraged to address a key biomedical challenge that viruses pose. A series of systematic studies on virus interactions with nanomaterials will be presented to identify the mechanisms that maximize thermal stabilization or virucidal action. The former will is used to produce additives for vaccines capable of keeping viral vectors stable for more than two months at 37°C, thus directly addressing the 'cold chain problem'. Virucidal efficacy is used to create drugs able to reduce the mortality of infections due to Dengue or Hepes. In all cases the focus used in this research is to find nanoparticles, macro- or small molecules that are safe and inexpensive so that the translation of this research in drugs for low-income countries could be deemed as feasible in the near future.