Integrating 2D materials into drug delivery systems to improve X-ray enhanced cancer treatments

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Abstract

Nanotechnology holds numerous potential benefits for treating and diagnosing disease, including the ability to transport complex therapeutic cargoes and target specific tissues. 2D-materials, embedded inside therapeutic nanoparticles, have the ability to enhance the therapeutic potency. Specifically, 2D materials loaded into liposomes sensitize the tumor to treatment, improving patient-specific therapeutic activity. The talk will also describe how the liposomal lipid composition affects its ability to internalize into triple-negative breast cancer cells, looking at the different molecular features, and how these can be leveraged to induce an anti-tumor immune response.
The evolution of drug delivery systems into synthetic cells, programmed nanoparticles with an autonomous SynBio capacity to synthesize diagnostic and therapeutic proteins inside the body, and their promise for treating disease, will be discussed.
Integrating inorganic 2D materials into drug delivery systems enables new therapeutic capabilities.

References

[1] Adir et al., Synthetic cells with self-activating optogenetic proteins communicate with natural cells, Nature Communications, 2022, 13, 2328
[2] Chen et al., Implanted synthetic cells trigger tissue angiogenesis through de novo production of recombinant growth factors, PNAS, 2022, 119 (38) e2207525119

Figures

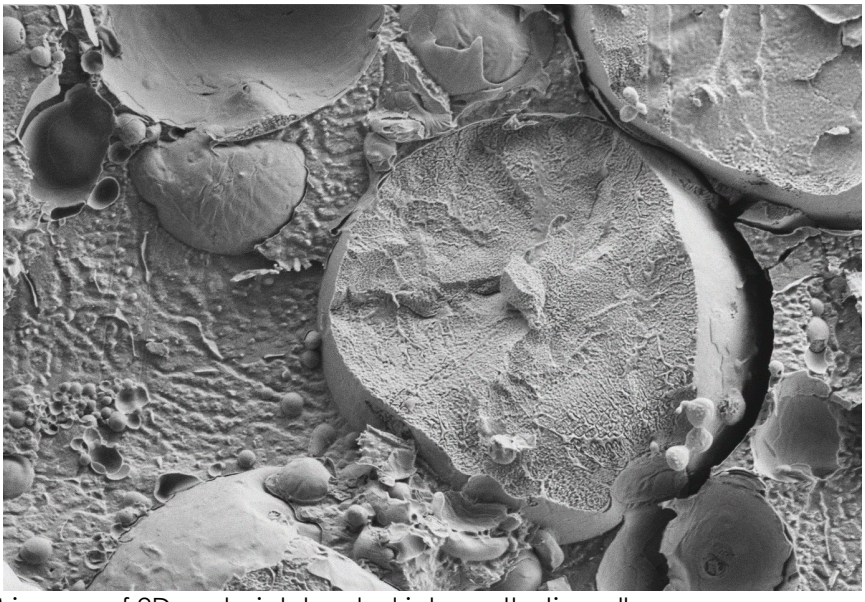

Figure 1: A cryoSEM image of 2D materials loaded into synthetic cells