

2Dmat Immune profiling by High-Dimensional Approaches

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We recently depicted the “Nano-immunity-by-design” where the characterization of 2D materials is not solely based on their physical-chemical parameters but also their immune-profiling. [1] The immune profiling can be revealed on its complexity in unique, informative ways: high dimensional approaches. [2,3] We exploited high-dimensional methods, such as single-cell mass cytometry and imaging mass cytometry on graphene and other novel two-dimensional materials, such as graphene and transition metal carbides/carbonitrides (MXenes). [4-6]

We revealed that the amino-functionalization of graphene oxide increased its immunocompatibility. [4] Moreover, we combined graphene with AgInS₂ nanocrystals, enabling its detection by single-cell mass cytometry on a large variety of primary immune cells. [5] Recently, we reported the immune modulation of specific MXenes, Ti₃C₂T_x in particular, in combination with their antiviral properties against SARS-CoV-2 again by single-cell mass cytometry and other high dimensional approaches. [6] Together with our published works, I will present unpublished results in a wider variety of novel 2D materials such as MXenes, MoS₂, WS₂ on human immune cell subpopulations, as well as on mice and swine models.

Our results conceptualize that chemical and immunological designs of 2D materials offer new strategies for their safe exploitation in biomedicine.

References

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