

Nanotechnology Frontiers at 20 years of NNI
Proceedings, December 1, 2020
<http://www.nseresearch.org/2020/>

NanoEngineering gone viral: plant virus-based immunotherapies and vaccines

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Abstract

Nanoscale engineering is revolutionizing the way we detect, prevent and treat diseases. Viruses are playing a special role in these developments because they can function as prefabricated nanoparticles. We utilize and build-upon the high-precision assemblies of the viral capsids and utilize them as platform technologies, engineered and repurposed for a desired function. More specifically, we turned toward plant viruses as a platform nanotechnology. We have developed a library of plant virus-based nanoparticles and through structure-function studies we are beginning to understand how to tailor these materials appropriately for applications targeting human, veterinary and plant health. In this presentation I will highlight applications of plant viruses as highly potent cancer immunotherapies and discuss the nanomanufacture of plant virus-based COVID-19 vaccine candidates integrated into slow-release vaccine delivery devices.