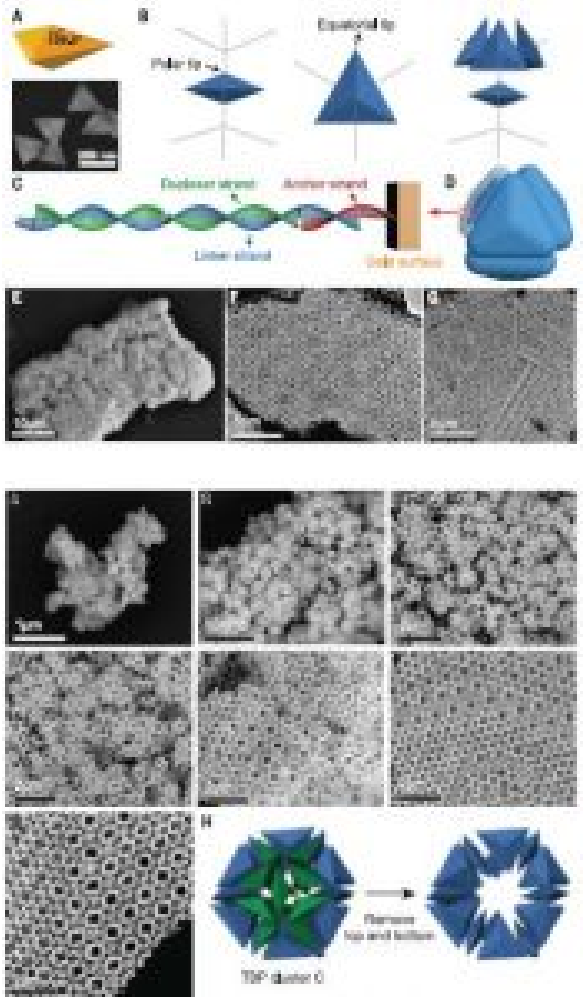
Congratulations to Foozieh Sohrabi

“Congratulations to Foozieh Sohrabi for getting Shahid Shahriyari Scholarship”

Clathrate colloidal crystals



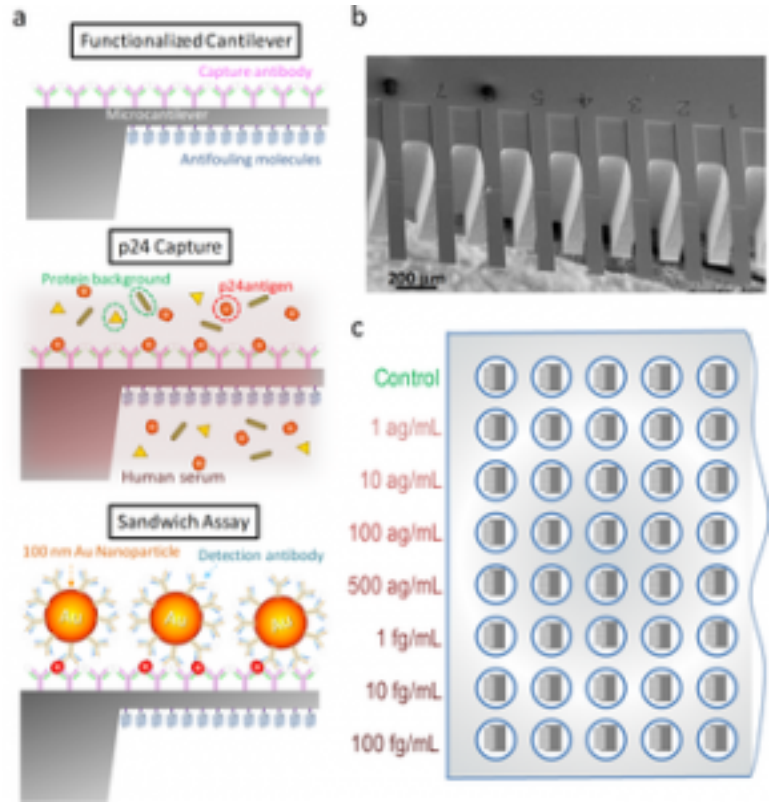
DNA-programmable assembly has been used to deliberately synthesize hundreds of different colloidal crystals spanning dozens of symmetries, but the complexity of the achieved structures has so far been limited to small unit cells.They assembled DNA-modified triangular bipyramids (~250-nanometer long edge, 177-nanometer short edge) into clathrate architectures. Electron microscopy images revealed that at least three different structures form as large single-domain architectures or as multidomain materials. Ordered assemblies, isostructural to clathrates, were identified with the help of molecular simulations and geometric analysis. These structures are the most sophisticated architectures made via programmable assembly, and their formation

can be understood based on the shape of the nanoparticle building blocks and mode of
DNA functionalization.

Source: http://science.sciencemag.org/content/355/6328/931

Related paper: Haixin Lin et al.,Clathrate colloidal crystals,Science 355, 931–935 (2017).

Ultrasensitive detection of HIV-1 p24 antigen by a hybrid nanomechanical-optoplasmonic platform with potential for detecting HIV-1 at first week after infection



Early detection of HIV infection is the best way to prevent spread of the disease and to improve the efficiency of the antiretroviral therapy. Nucleic acid amplification tests (NAAT) have become the gold-standard for detecting low-concentrations of the virus in blood. However, these methods are technically demanding and cost-prohibitive in developing countries. Immunoassays are more affordable and can be more easily adapted for point-of-care diagnosis. However, the sensitivity so far of these methods has been too low. They here report the development of a sandwich immunoassay that combines nanomechanical and optoplasmonic transduction methods for detecting the HIV-1 capsid antigen p24 in human serum. The immunoreactions take place on the surface of a compliant microcantilever where gold nanoparticles are used as both mechanical and plasmonic labels. The microcantilever acts as both a mechanical resonator and an optical cavity for the transduction of the mechanical and plasmonic signals. The limit of detection of the immunoassay is 10^{-17} g/mL that is

equivalent to one virion in 10 mL of plasma. This is 5 orders of magnitude better than last generation of approved immunoassays and 2 orders of magnitude better than NAAT. This technology meets the demands to be produced *en masse* at low cost and the capability for miniaturization to be used at the point-of-care.

Source: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0171899

Related paper: Priscila M. Kosaka et al.,Ultrasensitive detection of HIV-1 p24 antigen by a hybrid nanomechanical-optoplasmonic platform with potential for detecting HIV-1 at first week after infection, PLoS ONE 12(2): e0171899. doi:10.1371/journal.pone.0171899 (2017)