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Directed self-assembly of virus particles at nanoscale chemical templates SUNG-WOOK CHUNG, CHIN LI CHEUNG, Lawrence Livermore National Laboratory, ANJU CHATTERJI, TIANWEI LIN, JACK JOHNSON, Scripps Research Institute, JIM DE YOREO, Lawrence Livermore National Laboratory — Because viruses can be site-specifically engineered to present catalytic, electronic, and optical moieties, they are attractive as building blocks for hierarchical nanostructures. We report results using scanned probe nanolithography to direct virus organization into 1D and 2D patterns and *in situ* AFM investigations of organization dynamics as pattern geometry, inter-viral potential, virus flux, and virus-pattern interaction are varied. Cowpea Mosaic Virus was modified to present surface sites with histidine (His) or cysteine (Cys) groups. Flat gold substrates were patterned with 10-100nm features of alkyl thiols terminated by Ni-NTA or meleimide groups to reversibly and irreversibly bind to the Hys and Cys groups, respectively. We show how assembly kinetics, degree of ordering and cluster-size distribution at these templates depend on the control parameters and present a physical picture of virus assembly at templates that incorporates growth dynamics of small-molecule epitaxial systems and condensation dynamics of colloidal systems. This work was performed under the auspices of the U. S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

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