

Publication

A synthetic nanomaterial for virus recognition produced by surface imprinting

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Author(s) Cumbo, Alessandro; Lorber, Bernard; Corvini, Philippe F-X; Meier, Wolfgang; Shahgaldian, Patrick

Author(s) at UniBasel [Meier, Wolfgang P.](#) ;

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Major stumbling blocks in the production of fully synthetic materials designed to feature virus recognition properties are that the target is large and its self-assembled architecture is fragile. Here we describe a synthetic strategy to produce organic/inorganic nanoparticulate hybrids that recognize non-enveloped icosahedral viruses in water at concentrations down to the picomolar range. We demonstrate that these systems bind a virus that, in turn, acts as a template during the nanomaterial synthesis. These virus imprinted particles then display remarkable selectivity and affinity. The reported method, which is based on surface imprinting using silica nanoparticles that act as a carrier material and organosilanes serving as biomimetic building blocks, goes beyond simple shape imprinting. We demonstrate the formation of a chemical imprint, comparable to the formation of biosilica, due to the template effect of the virion surface on the synthesis of the recognition material.

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