Towards Stable Magnetization of Plant Viral Nanorods via Covalent Coupling of Metal Oxide Particles

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Using biomolecule complexes such as viruses for nanoapplications offers the possibility to take advantage of their unique size and their multivalence. *Tobacco mosaic virus* (TMV), a tube-shaped plant virus self-assembled from one single-stranded RNA and 2130 identical, helically arranged coat proteins is ideal as a scaffold due to its high stability (wide range of the pH value, high temperatures and tolerance to several organic solvents) regarding its biological origin. In addition selective end-modification and fast immobilization has been demonstrated [1], [2]. Adding magnetic functionality is a matter of interest, especially for medical treatment (hyperthermia) and switchable devices (spintronics) as ferrofluids supplemented with TMV derivatives already show dramatic performance enhancement [3], [4]. We therefore intend to achieve stable magnetization of TMV via covalent coupling of magnetic particles carrying a functionalized shell in order to produce virus-scaffolded magnetic nanorods for applicable devices. Upon preparation of different types of TMV-nanoparticle complexes, standard methodology of biochemistry and purification needed adaptation to the exceptionally large hybrid assemblies of organic and inorganic materials. First promising architectures were generated, which are currently being characterized with respect to magnetism and mechanical stability.

References

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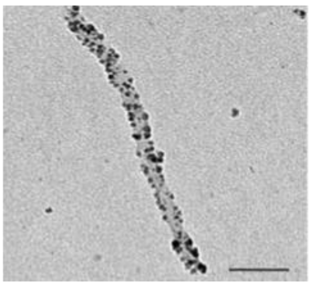
Figure



Transmission electron microscopy images of *Tobacco Mosaic Virus* decorated with magnetic nanoparticles. Bar 100 nm.