ELECTRICAL CHARACTERIZATION OF TMV-BASED NANOSTRUCTURES

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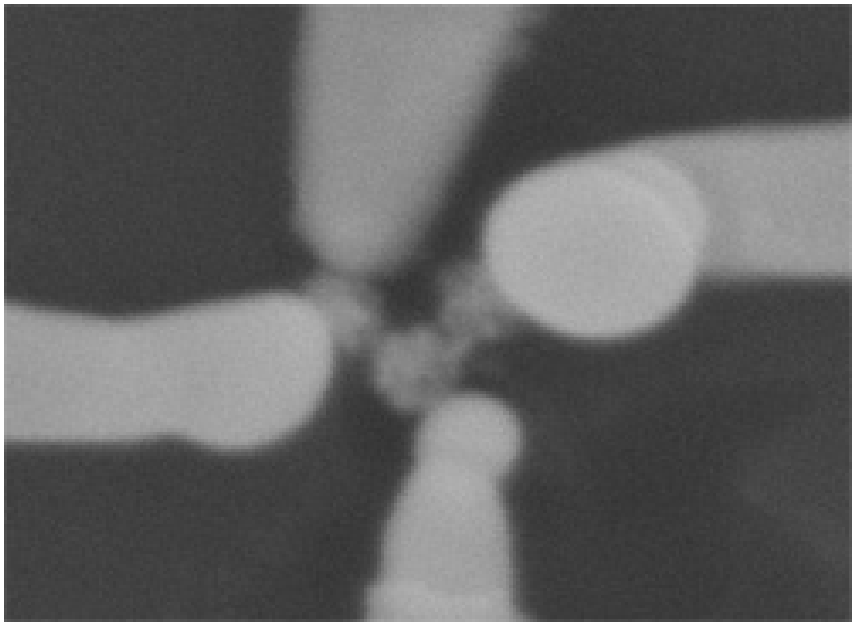
The wild-type Tobacco mosaic virus (TMV) is a 300nm long tube with 18nm outer and 4nm inner diameters. TMV virus is characterized by the extraordinary chemical and physical stability.

The internal and external surfaces of the virion protein consist of repeated patterns of charged amino acid residues, such as glutamate, aspartate, arginine, and lysine. These functionalities offer a wide variety of nucleation sites for surface-controlled inorganic deposition, which, in association with the high thermal and pH stability, can exploited in the synthesis of unusual materials such as high aspect ratio nanowires.

Using the TMV, nanostructures consisting of platinum, palladium, nickel, zinc, and gold have been prepared on surface and within the TMV channel using electroless deposition. Electrical properties of single nanowires has been investigated by four-probe electrical transport measurement.
Four independently controlled STM tips were used to contact the virus and high resolution scanning electron microscope (SEM) were used for real-time imagining. Multiple I-V measurements were taken at varying tip separations and the change in resistance with separation was observed to be in good agreement with predictions based on the nanowire geometry.

Figures:



An SEM image of a 4 probe measurement on a coated TMV virus