

Characterization of Bacteria by a Nondestructive Sample Preparation Method in a TEM System

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Abstract : In this work, we present a nondestructive method to characterize bacteria in a TEM system. Unlike the conventional TEM specimen preparation method, which needs to thin the specimen in a destructive way, or spread the samples on a tiny millimeter sized carbon grid, our method is easy to operate without the need of sample pretreatment. With a specially designed transparent chip that allows the electron beam to pass through, and a custom made chip holder to fit into a standard TEM sample holder, the bacteria specimen can be easily prepared on the chip without any pretreatment, and then be observed under TEM. The centimeter-sized chip is covered with Au nanoparticles in the surface as the markers which allow the bacteria to be observed easily on the chip. We demonstrate the success of our method by using *E. coli* as an example, and show that high-resolution TEM images of *E. coli* can be obtained with the method presented. Some *E. coli* morphology characteristics imaged using this method are also presented.

Keywords : bacteria, chip, nanoparticles, TEM

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