Focused Ion Beam (FIB) in Bio-Materials Interfacial Research

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Interface is one of the most important, crucial and interesting subjects in any materials research. However, specimen preparation specifically for interfacial investigation has been a great challenge due to so many different varieties of materials and different purposes of research. This paper presents some unique applications of FIB in TEM specimen preparation, with emphasis on bio-minerals (soft and hard) interfaces.

With the aid of FIB, cross-sectional TEM thin sections of selected bio-materials were prepared and will be discussed. Cross-sectional TEM images show internal and interfacial structures of apatite-polymer using FIB technique. The increases of size (thickness and length) may represent the different stages of crystal growth. Examination of the encrustation in the urinary tract has traditionally been based on SEM due to the difficulty of TEM sample preparation. With FIB, a cross-sectional TEM view of the dried tissue layer on nanocrystalline (nc) Ti substrate can be observed/studied. These TEM results demonstrated the unique capability of FIB in preparing difficult samples that had been thought to be impossible.