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Resolution of 5.4 nm from a Photoemission Electron Microscope Corrected with an Electrostatic Mirror[1] R.C. WORD, G.F. REMPFER, L. ALMARAZ, T. DIXON, R. KONENKAMP, Portland State University — We report resolution of 5.4 +/- 0.5 nm for a photoemission electron microscope (PEEM) that employs an electrostatic mirror that simultaneously corrects chromatic and spherical aberration. This is a marked improvement over the 8 to 10nm resolution obtained by uncorrected PEEMs, which suffer particularly from chromatic aberration resulting from the acceleration of low energy photoelectrons from the specimen surface. The resolution was obtained in a biological application using sarcoplasmic reticulum from skeletal muscle as a specimen. The sample was deposited on a low photoemission substrate of chromium-coated glass and illuminated with UV light from a 100-mW 244-nm Ar laser. Resolution was determined using the 0.1 to 0.9 contrast change in intensity line profiles as well as by a 2-dimensional Fast Fourier Transform method. The PEEM employs a Y-branched beam separator, three deflection magnets, and twelve electrostatic lenses all heavily filtered to suppress voltage instabilities. Spherical and chromatic aberration coefficients were determined by computer modeling and in-situ experiments to be 1 cm. Once the instrument is perfected, the resolution should be 2 nm.

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