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**Enhancing the spatial resolution in PEEM beyond 30nm using diamondoid surface coating** HITOSHI ISHIWATA, Stanford University, HENDRIK OHLDAG, Stanford Synchrotron Radiation Lightsource, ZHI-XUN SHEN, NICK MELOSH, Stanford University, ANDREAS SCHOLL, Advanced Light Source — The spatial resolution in Photoemission Electron Microscopy typically does not allow imaging features smaller than 30nm. PEEM resolution is limited by chromatic and spherical aberrations of the electrostatic lenses in the microscope column in combination with a wide angular and energy distribution of the secondary electrons to make these aberrations significant. Diamondoids have recently been shown to act as a monochromator for secondary electrons, thus reducing chromatic aberration in PEEM. In addition to improving the resolution of the microscope the diamondoid coating will also enhance the image intensity since now more secondary electrons will be accepted by the aperture. At 10kV the spatial resolution of PEEM3 is of the order of 150-200nm so that the magnetic domains can hardly be recognized anymore without the diamondoid coating. However, they become visible on the sample that was coated with diamondoids, indicating that the coating improved the spatial resolution by monochromatizing the secondary electrons. We also find that the image intensity is enhanced by a factor of 2-3 with the diamondoid coating. These initial findings on samples with relatively large domains of 150nm are very encouraging and we are therefore convinced that we can push the resolution limit below 30nm studying samples with smaller domains at higher acceleration voltages of 20kV.

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