OPTICAL AND SCANNING ELECTRON MICROSCOPIES IN EXAMINATION OF ULTRATHIN FOILS

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Very low energy scanning transmission electron microscopy is emerging as a novel tool for examination of ultrathin foils [1] to learn more about the electron structure of solids. The electron micrographs provide image contrasts governed by the “effective thickness” of the sample proportional to the inner potential and at lowest energies the local density of electron states in the direction of impact of the electron wave starts to dominate. The optical methods are used during the sample preparation and thickness measurement of the layers. The laser confocal microscope Olympus Lext OLS 3100 was used for preliminary observations of the 10 nm C foil prepared by magnetron sputtering in nitrogen atmosphere on a flat glass covered by a disaccharide layer. Disaccharide was dissolved in distilled water, dropped on glass, dried, covered with carbon and the foil was unstuck on a 25 μm period copper grid usually used for the transmission electron microscopy. The thickness was first estimated from the measurement by X-ray diffraction. Figure 1 shows the layer flake imaged by the laser microscope and by low energy electrons in the reflected and transmitted mode. Similar experiments have been performed on a 3 nm Au foil [2], [3].

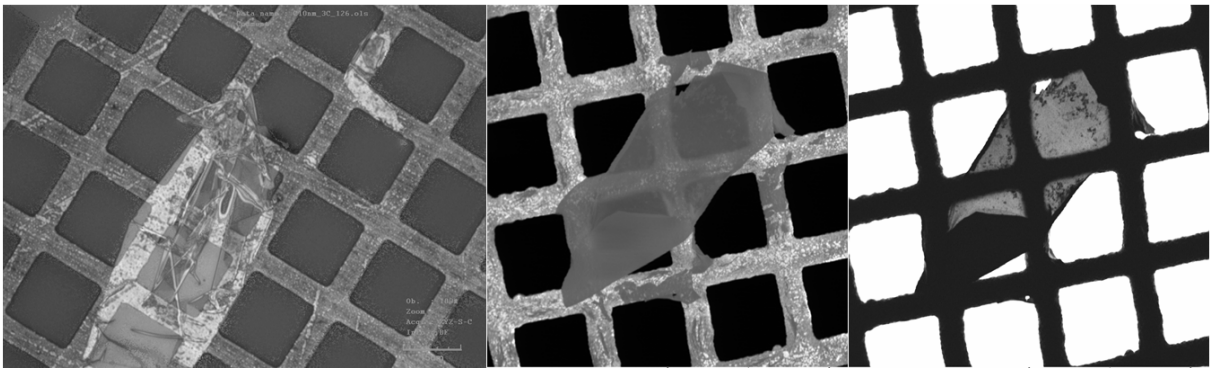

Figure 1: 10 nm carbon foil on a 25 μm period Cu grid. Left: the confocal microscope image; middle and right: imaging by the low energy scanning electron microscope at 400 eV in the reflected (middle) and transmitted mode (right)

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