Cs CORRECTED TRANSMISSION ELECTRON MICROSCOPY OF METAL-CARBON THIN FILMS

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Transmission electron microscopy is powerful method for structural characterisation of materials from mikro- to piko-meter scale. Modern instruments offer a spatial resolution better than 1 angstrom (100 pm) due to development of a spherical aberration (Cs) corrector. The corrector allows to obtain negative and positive Cs values what is unattainable for conventional magnetic lenses. It opens possibility of visualisation structure of materials consisting of light and heavy atoms like in the case of carbon-metal composites. Typical distance between carbon atoms is 142.1 pm in graphite hexagonal sheets and 154.5 pm for diamond. Most of heavy metal atoms are separated by distance bigger than 200 pm. For metal-carbon composites crucial role play identification of structural phases and interfaces among them. Thin films produced in physical and chemical vapour deposition from fullerene and metaloorganic precursors abound with different crystallographic structures. Most typical of them are fullerites, turbostratic graphite, metal nanoclusters, carbon fibres, onions and nanotubes. Thanks to Cs corrected TEM investigations such structures can be observed in details. For an example an epitaxial relation between a palladium nanopartile and surrounding graphene sheets can be described. It is also possible to determine an ordering and successive interplanar distances of the graphite basal planes. That and other structural features examined by Cs corrected microscope will be presented. A few words will be addressee to focus ion beam (FIB) technique for specimen preparation, which allows to achieve a cross-sectional view of the film.

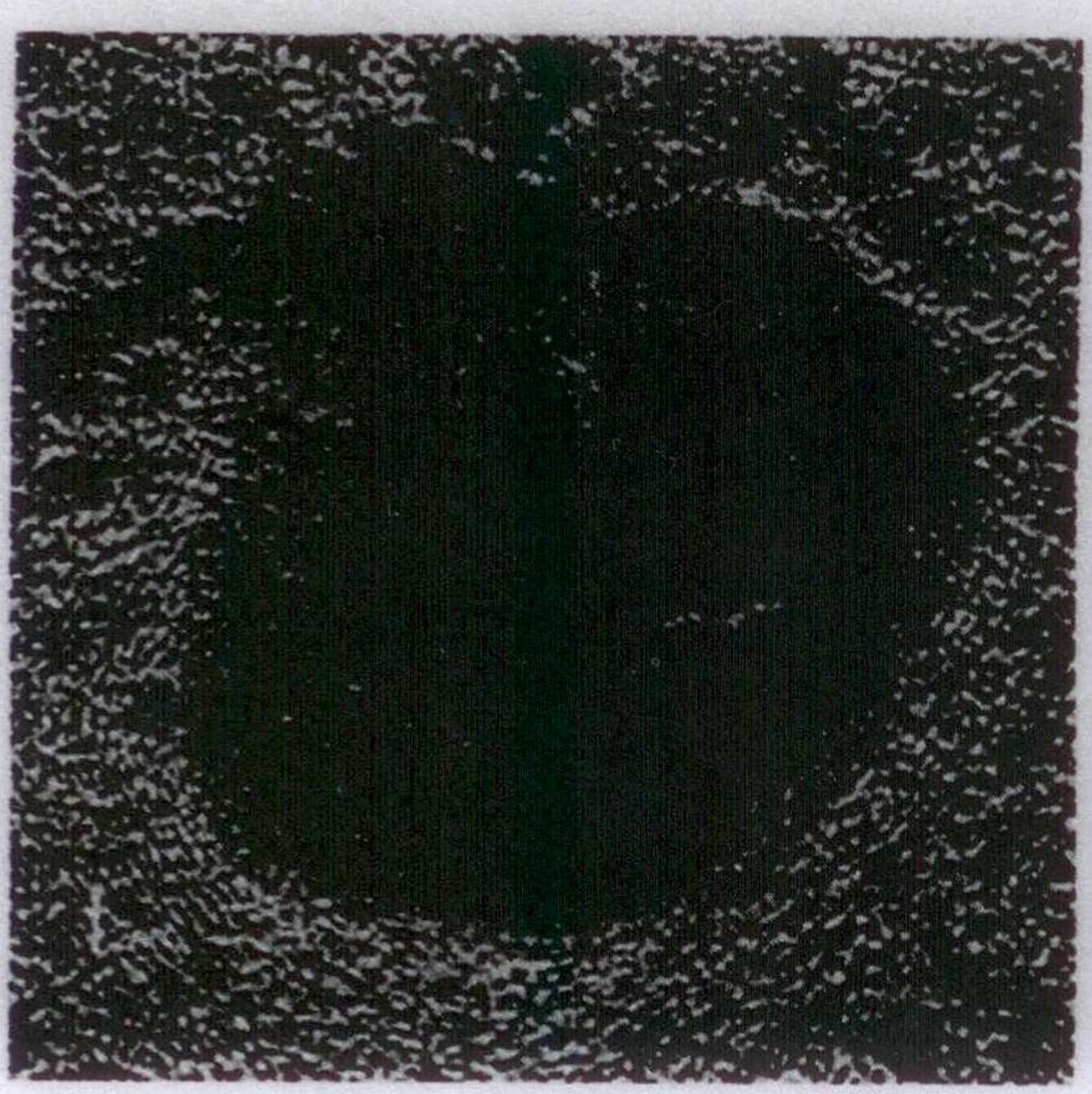

Fig. Cs corrected high-resolution image of Pd nanograin with twines and graphite shell.

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