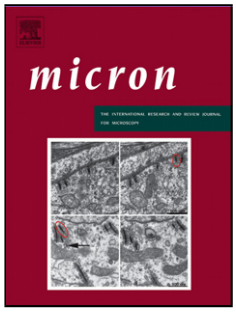

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Electron Energy Loss Spectroscopy Analysis of the Interaction of Cr and V with MWCNTs

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Highlights

- Experimental demonstration of a chemical reaction of V and Cr with MWCNT-walls.
- EELS maps show a VC interfacial layer between VN and MWCNTs at 750°C.
- Cr can dissolve MWCNTs completely to Cr_3C_2, when heated to 500°C in situ in a TEM.
- Experimental demonstration of the strong reaction of early 3d metals with MWCNTs.

The presented scanning transmission electron microscopy (STEM) and electron energy-loss spectroscopy (EELS) results show the strong reaction of Cr and V with the graphitic walls of MWCNTs. For Vanadium, an interfacial VC layer could be observed at the interface between VN and MWCNTs, when the samples were heated in situ to 750°C. Knowledge about this interfacial VC layer is important for the formation of VN-MWCNT hybrid materials, used in supercapacitor electrodes, often synthesized at high temperatures. Chromium reacts at 500°C with the MWCNTs to form Cr_3C_2 and in some cases, dissolved the MWCNT completely. Together with the previously published results about the interaction of MWCNTs with Cu (no interaction) and Ni (a slight rehybridisation trend for the outermost MWCNT-wall observed