 ROBL-CRG	Experiment title: In-situ investigation of the behavior of Fe catalyst during the CNT formation	Experiment number: 20_02_688
Beamline: BM 20	Date of experiment: from: 17.2.2010-23.2.2010	Date of report: 26.1.2011
Shifts: 18	Local contact(s): Dr. Carsten Baetz (baetz@esrf.fr)	<i>Received at ROBL:</i>
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Results

Carbon nanotubes (CNTs) are promising candidates as interconnects for future microelectronic devices.[1] One challenging question is how to growth CNTs on conductive supports which are often reactive in the high temperature, reactive gas atmospheres used in carbon nanotube growth. Such supports (e.g. Ta, TiN, CoSi₂) may also interact with the metallic catalyst particles from which the CNTs nucleate.[2,3] Therefore the phase formation and behaviour of the complete support-catalyst-CNT system is of interest. TiN with Fe as catalyst show during reaction the

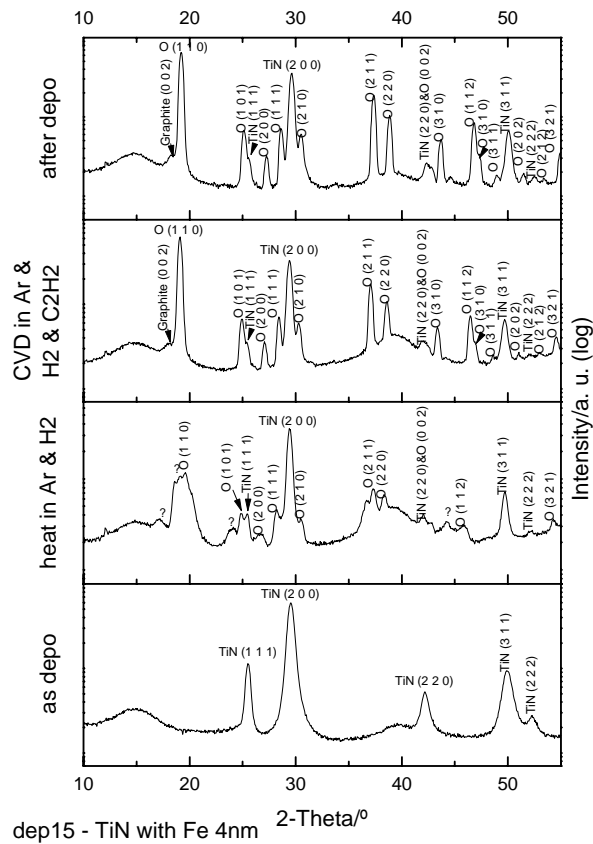


Fig.1: Phase evolution of TiN during CNT growth.

formation of TiO_2 from only minute gas contaminations. Means to avoid this are for example plasma pre-treatment [2], where the effect of this on structure was studied by in-situ XRD. Tantalum as conducting buffer shows under these conditions also the formation of Tantalum oxide as well as tantalum carbide. Cobalt silicide [3] in contrast seems to offer strongly improved chemical and structural stability.

Publication of the results are in preparation.

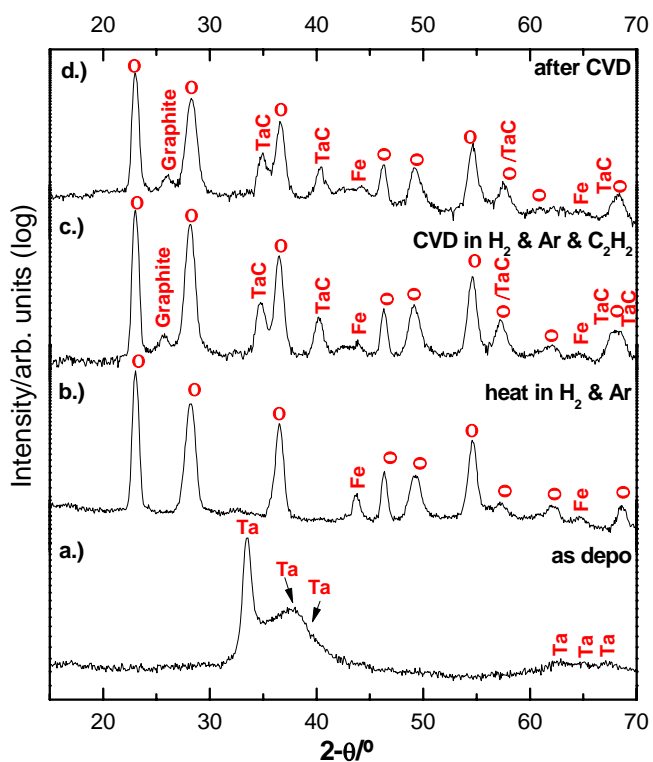


Fig. 2: Phase evolution of Ta during Fe catalysed CNT growth. Data is rescaled for 1.541 Å wavelength.

References

- [1] Robertson et al. *Diamond Relat. Mater.* 18, 957 (2009)
- [2] Esconjauregui et al. *Appl. Phys. Lett.* 95, 173115 (2009)
- [3] Zhang et al. *J. Appl. Phys.* 108, 024311 (2010).