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Filling of single-walled carbon nanotubes with manganese fluoride

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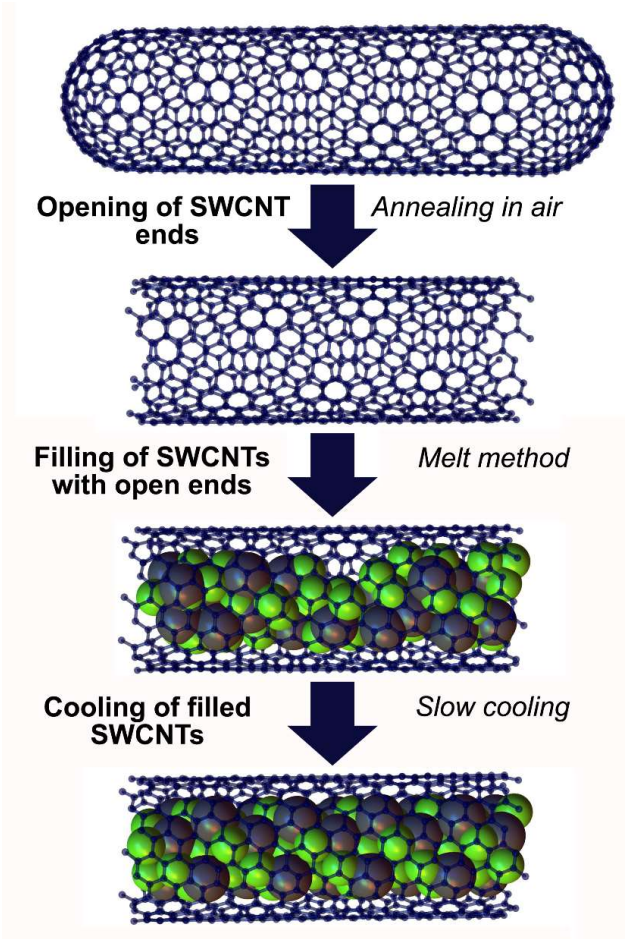
INTRODUCTION & AIM

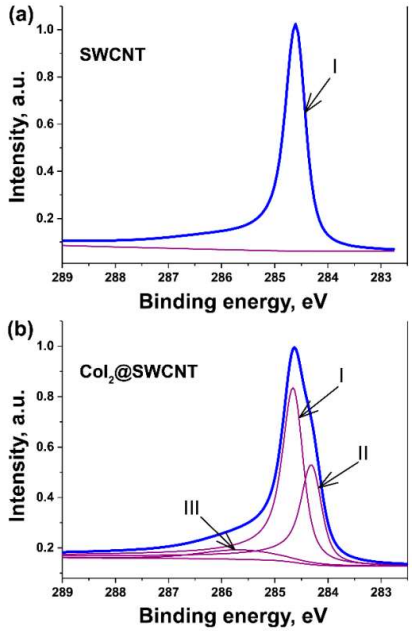
It is important to find new materials for water treatment. The interplay of the physical properties of materials leads to new results [1-3]. Combining several methods for the investigation of materials allows the full range of information on the modified physical properties to be deduced. Manganese fluoride (MnF_2)-filled single-walled carbon nanotubes (SWCNTs) show great potential in water treatment.

METHOD

This salt is inert with a very high melting point, and it was introduced into SWCNTs for the first time. Here, we studied the modified electronic structure of the filled SWCNTs with several methods, such as transmission electron microscopy (TEM) and Raman spectroscopy.



The schematics of the filling procedure of the SWCNTs.



The C 1s X-ray photoelectron spectra of the pristine, and cobalt iodide-filled SWCNTs [4]. Copyright 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license.

CONCLUSION

The TEM method showed the filling of metallic and semiconducting carbon nanotubes with high filling degrees and high purity. The TEM method, along with Raman spectroscopy, is capable of revealing the electronic structure of the filled SWCNTs. These methods are fundamental for finding the Fermi level shifts in the filled SWCNTs. P-doping in the filled SWCNTs was proven by shifts in the RBM and G-band Raman peaks. The obtained information shows the potential of the new compound, MnF_2, for water treatment applications.

REFERENCES

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