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Semiconducting single-walled carbon nanotubes filled with silver chloride

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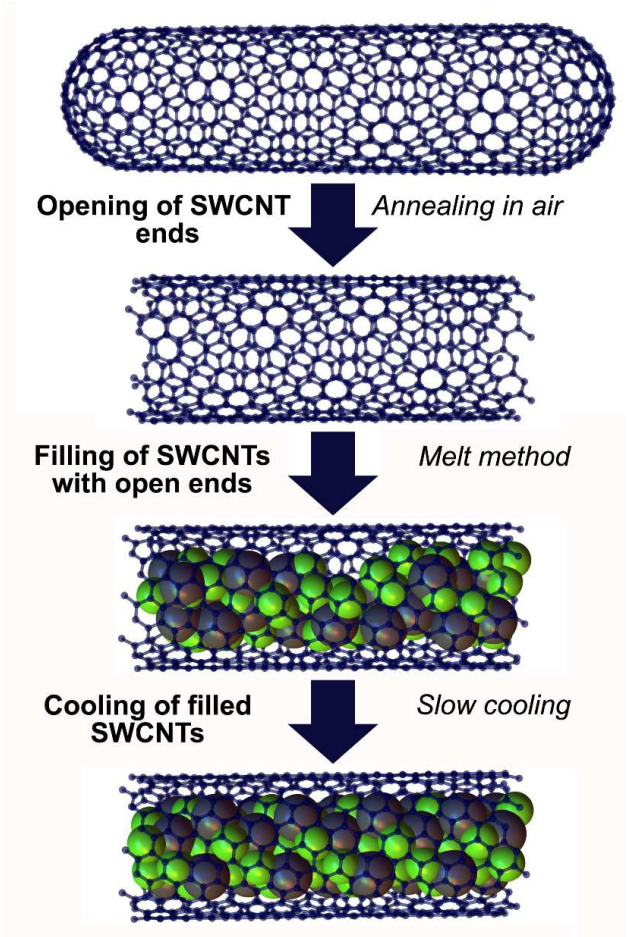
INTRODUCTION & AIM

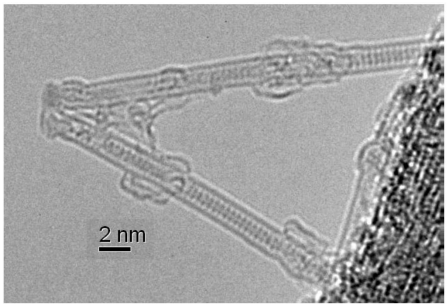
The foundations of the electronic structures of single-walled carbon nanotubes (SWCNTs) are studied for applications in water treatment. The SWCNTs have metallic and semiconducting physical properties. To improve the functionality of the SWCNTs, they are filled [1-4]. The methods of improving the functionality of the SWCNTs include surface functionalization and filling.

METHOD

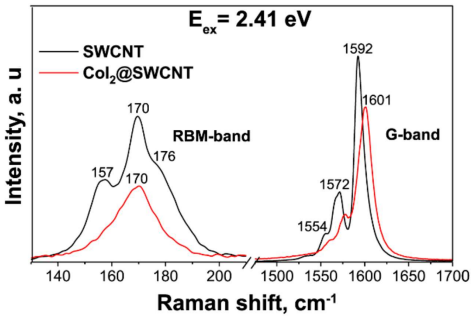
In this contribution, the semiconducting SWCNTs were filled with silver chloride (AgCl). Silver chloride is an electron acceptor. The filling of AgCl in the SWCNTs causes strong Fermi level variations. Raman spectroscopy proved the doping-mediated differences in the electronic structures of the pristine and the filled SWCNTs.



The schematics of the filling procedure of the SWCNTs.



The high resolution transmission electron microscopy image of the cobalt iodide-filled SWCNTs [5]. 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.



The Raman spectra of the cobalt iodide-filled SWCNTs [5]. 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 physical properties of the different-diameter SWCNTs were modulated in a different manner with the filling. This was demonstrated with the radial breathing band, and the G-band of Raman spectra.

REFERENCES

[1] Kharlamova M.V. et al. Nanotechnologies Russ. 2009, 4, 634 – 646.
[2] Kharlamova M.V. et al. JETP Lett. 2010, 91, 196 – 200.
[3] Kharlamova M.V. et al. J. Spectrosc. 2018, 2018, 5987428.
[4] Kharlamova M.V. et al. J. Mater. Sci. 2018, 53, 13018 – 13029.
[5] Kharlamova M.V. Nanomaterials 2023, 13, 176.