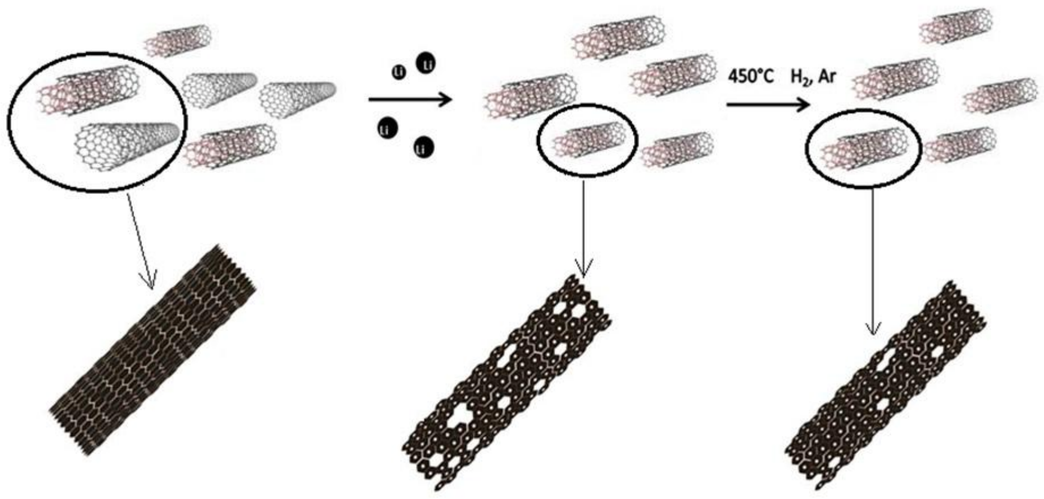
REMOVING THIN SINGLE-WALLED CARBON NANOTUBES FROM MIXTURE OF SINGLE- AND DOUBLE-WALLED CARBON NANOTUBES USING REACTION WITH LITHIUM

Zuzana Komínková

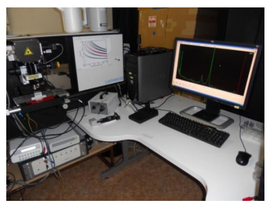
J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i., Dolejškova 2155/3, 182 23 Prague 8, Czech Republic
Department of Physical Chemistry, Faculty of Science, Palacky University, tř. 17. listopadu 1192/12, 771 46 Olomouc, Czech Republic **e-mail: zuzana.kominkova@jh-inst.cas.cz**



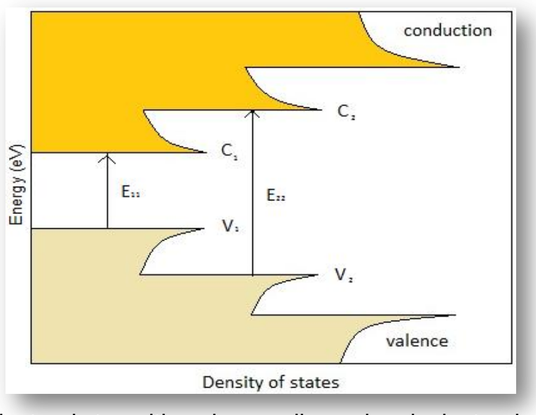
We investigated **mixture of single-walled carbon nanotubes (SWCNTs) and double-walled carbon nanotubes (DWCNTs)** after **reaction with lithium** and subsequent **thermal treatment**. Due to chemical reaction with lithium we achieved the **removing of thin SWCNTs from mixture**. **Annealing at 450°C in hydrogen and argon** caused decrease of defects in carbon lattice

Samples were examined by **Raman spectroscopy** and electrochemical doping using **in-situ Raman spectroelectrochemistry**.

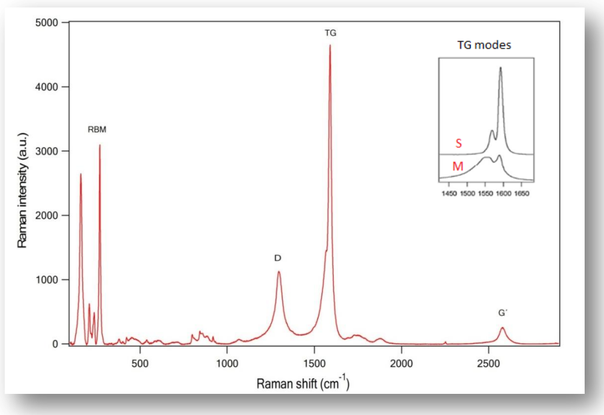
Raman spectroscopy



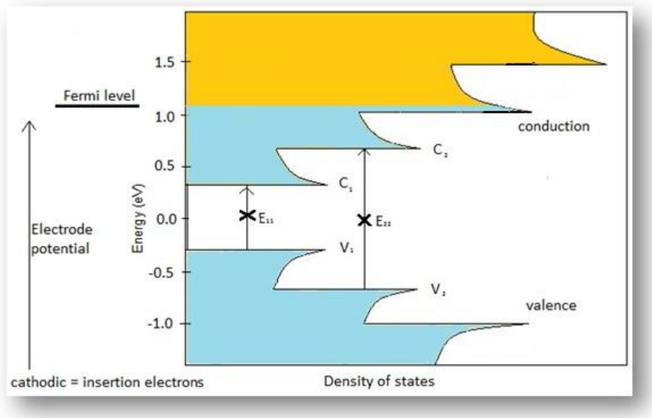
In-situ Raman spectroelectrochemistry (Raman spectroscopy + cyclic voltammetry)



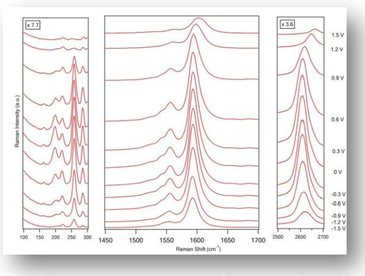
Electronic transitions in one-dimensional electronic density of states (DOS) of semiconducting nanotube..



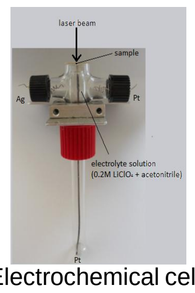
Raman spectrum with basic Raman bands.



semiconducting nanotube during electrochemical charging.

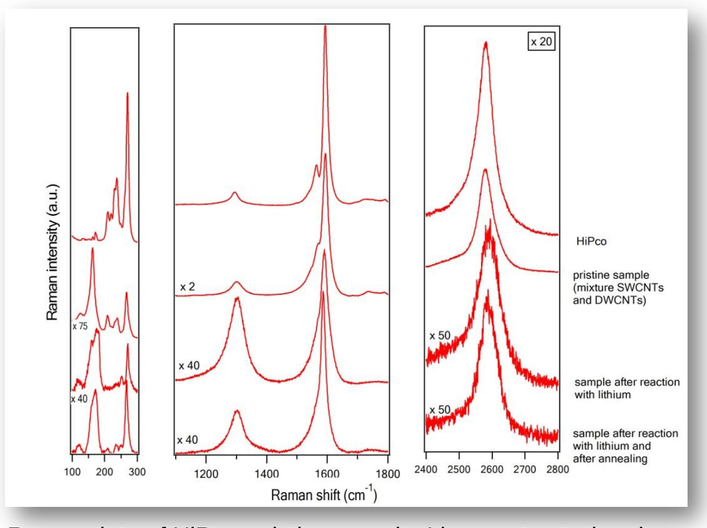


In-situ Raman spectroelectrochemical spectrum.

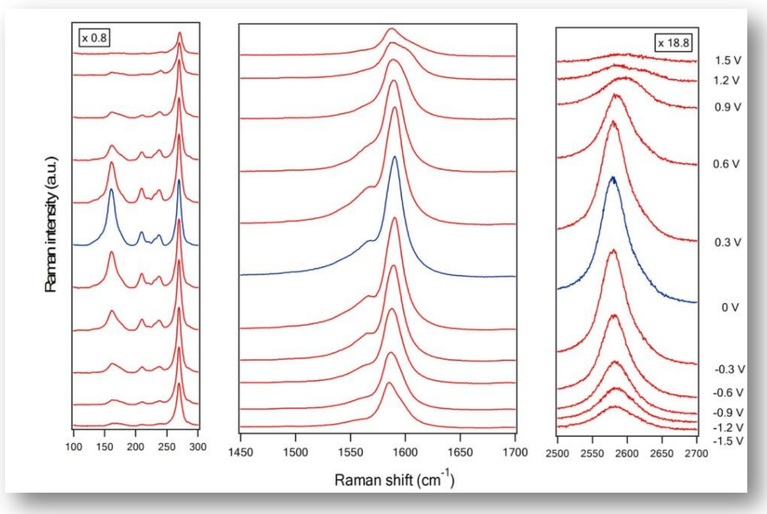


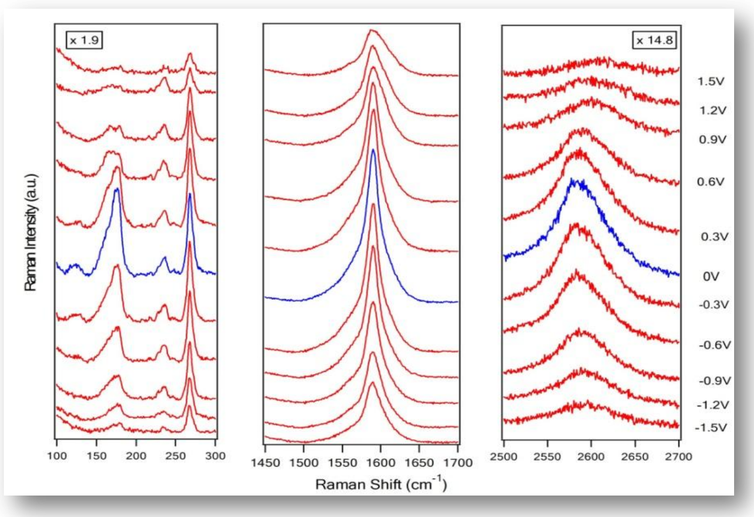
Electrochemical cell.

In Raman spectrum we focused on the **radial breathing modes (RBMs)**, whose intensity decrease rate provided information about present SWCNTs or DWCNTs in mixture, and on the **disorder induced mode (D mode)**, which is induced by presence of defects in the nanotube.



Raman data of HiPco, pristine sample, Li-vapor treated and Li-vapor treated after annealing. Raman spectra are measured in the dry state samples without electrolyte.





In-situ Raman spectroelectrochemical data on pristine sample (SWCNT-DWCNT mixture) (on the left) and Li-vapor treated (on the right) in the electrode potential range from -1.5 to 1.5 V. The spectra are excited by 1.58 eV (785 nm) laser radiation. The electrochemical potential is labeled next to each curve.

Conclusions: Successful removal thin SWCNTs from mixture SW- and DWCNTs and reduction number of defects in carbon lattice.

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