PREPARATION OF SILICON NANOTUBES WITH POLYMERIC GROUPS

KVÁČA Zdeněk, TARMAN S., MATZ V, MOHYLA M., OLŠÁK V. & HUMLLÍČEK J.

Abstract

New semiconductor structures for nanoelectrics require nanostructures of silicon compatible with current silicon technology even if as well doped and functional carbon nanotubes are ferric and semi conducted.

For silicon nanotubes properties modification and functional surface properties reaction of surfaces hydroxyle groups were applied. In all cases, only the molecules with long aliphatic chain or aromatic cycles were bonded. Infrared spectroscopy method was used to identify alcoxides and aroxides compounds in bond of organic hydroxybases, in bond of organic aminobases was found ammonium bonds and in bond organic acids was found carboxyl bonds.

Silicon nanotubes were produced in solvothermal reduced conditions using disproportion of silicon monoxide in reduced, anorganic and organic solvent. Layers of SiO2 were etching by heating and ultrasonic mixing by fluoride hydrogen acid. Silicon nanotubes were dried and annealing during different temperature in controlled (Ar, H) atmosphere. For first functionalization monofunctional molecules were used. Hybrid monomer – silicon nanotubes were produced by solvothermal functionalization of silicon nanotubes by solution multifunctional monomer of organic basis or acid. Nanocomposite polymer – silicin nanotubes were produced by polyreaction with second monomer.

Heat stability and decomposition of organic component was analyzed by thermal analysis (DSC/TG).

Bonded functional groups were indentified by infrared spectroscopy (FTIR).

Composition and structure of nanocrystals was analyzed by roentgen fluoresce (XRF) and diffraction, nanomorphology of nanocrystals by scanning (SEM ), transmition (TEM) and tunneling (STM) and forced (AFM) microscopy.

Photoelectric transportation properties and optical energy gap were measured on thin layers composed on golden glasses by spin coating method.

Keywords: nanotubes, silicon, solvothermal, hydrothermal, photoelectric

Author did not supply full text of the paper/poster