## Nanocomposites and nanomaterials

# Composite polyacrylonitrile fibers with surface coated potassium nickel hexacyanoferrate nanoparticles: synthesis and application

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Insoluble divalent transition metal hexacyanoferrates (HCFs) are important inorganic compounds that have been intensively investigated during the past decade for the preparation of molecular magnets, optical devices, rechargeable solid state batteries, electrochromic devices, and adsorbents.

Potassium nickel hexacyanoferrate (KNiHFC) has been widely studied for separation and sensing of cesium radionuclides owing to its strong selectivity for Cs ions in the presence of alkaline earth and alkali metal ions, high sorption capacity, chemical resistance in acid and alkaline solutions, mechanical and thermal stability over many other metal hexacyanoferrates. Several attempts have been made to use KNiHFC for the monitoring and remediation of liquid radioactive waste with high salt content. However, it is usually synthesized as fine or ultrafine grains which are difficult for practical applications due to their low mechanical stability and tendency to become colloidal in aqueous solution. In order to improve their mechanical properties, deposition of insoluble HCFs on various solid supports has been suggested as a possible solution.

Fibrous polymers with ion-exchange groups are very perspective host solid support for synthesis of composite adsorbent with HCFs grains. In the present work new composite fibers are synthesized by *in situ* deposition of KNiHFC layer on the surface of modified polyacrylonitrile fibers. Data of scanning electron microscopy, X-ray diffraction, and Fourier transform infrared spectroscopy confirmed the formation of KNiHCF homogeneous phase on the fabric surface, which consisted of crystalline cubic-shaped nanoparticles. Composite fibers are chemically stable in both acidic and alkaline solutions, and are characterized by high selectivity for cesium ions in the presence of excess of competitive sodium and potassium ions.