

[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to public)]

Technology Information	
Area	<input type="text"/> 1,3,4,5 (Select the number from "Areas of Technologies Requested")
Title	Biosafe Nanocomposite Polymer Sorbent (BNPS) for highly radioactive water capture in solid state and Sr and Cs isotopes sorption
Submitted by	MedProFarm Ltd.
<p>1. Overview of Technologies (features, specification, functions, owners, etc.)</p> <p>The investigations carried out in D.Mendeleyev University of Chemical Technology of Russia have shown that: 1)BNPS is effective gelling agent; 2) presence of salts in the water improves the strength of the gel; 3) upon drying the gel bonded water is easily derived from the gel into the vapor space; 4) can be used to prevent spillage of toxic solutions and muds and their localization the required volume (Official report of D.Mendeleyev University of Chemical Technology of Russia)</p> <p>By the atomic absorption spectrophotometry (AAS) investigation it was shown that BNPS can bind Sr - 22% by weight, and Cs-25% by weight Polymer sample was subjected to high irradiation for 24h it is resistant to high doses of radiation with the absence of radiation crosslinks in its structure as evidenced by the identity of the H-NMR spectrum and the complete identity of the two hydrogen triplet peaks. It shows a strong stability of the complete structure of the polymer and its inertness to high dose of radiation. Curried out investigations on force spectroscopy and RAMAN spectrometry of the native BNPS and its samples saturated with Sr, Cs and Sr+Cs showed a unique stable structure for all the samples. Also there were proofed BNPS nontoxic and biosafe properties on human keratinocyte-derived A431cells. (our own results carried out in Institute of Theoretic and Experimental Biophysics (ITEB) RAS, Puschino)</p> <p>All the detaile descriptions of the experimental results, photos and sample can be provided at your request</p>	
<p>2. Notes (Please provide following information if possible.)</p> <p>- Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)</p> <p>BNPS can be used: for binding and decontamination (in solid state) of highly radioactive water from reactors; possible for radioactive fuel binding (hydration) for subsequent safe removal from the reactor; a filler for portable and industrial filters for purification of highly radioactive liquids (Area 3); as enterosorbent because of its biosafe properties. It can be used in various industries, nuclear plants, agriculture and medicine.</p>	

Hydrated sample of BNPS stores without water leaks from 21.10.2012 (first-time synthesis) and with the conclusion #3 of Official report of D.Mendeleyev University of Chemical Technology of Russia all of these could solve the problem of 10 years storage.

All the necessary reagents for the synthesis of the sorbent BNPS are widely available at low cost in Japan. Synthesis of the sorbent itself takes a little time. Therefore, the production of BNPS can be organized in a short time.

- Challenges:

- 1.1., 1.2.- tank leaks

- 3.1., 3.2- BNPS must be placed in a membrane bag with 100mkm pore

4.1.- Hydrated gel polymer BNPS to block water inside the buildings

5.3- BNPS can collecting radioactive Sr

- Others (referential information on patent if any)

RF Patent priority from 19.06.2012. PCT under ugreement.

#### 【Areas of Technologies Requested】

- (1) Accumulation of contaminated water (Storage Tanks, etc.)
- (2) Treatment of contaminated water (Tritium, etc.)
- (3) Removal of radioactive materials from the seawater in the harbor
- (4) Management of contaminated water inside the buildings
- (5) Management measures to block groundwater from flowing into the site
- (6) Understanding the groundwater flow