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nanofibers based microfluidics chip for detection and absorption of nuclear radioactive solutions

Radioactive wastes are usually by-products of nuclear power generation and other applications of .nuclear technology, such as research and medicine. Previous sampling techniques required sample volumes ranging in the tens of milliliters and poses a high level risk of radiation exposure to analytical personnel and equipment. Nanotechnology has provided various structures which reduce oxidative damage in engineering applications with great efficiency. Here we have developed water stable PVA nanofibers and used them for two purpose, adsorption of nuclear radioactive waste by coating their surface with a natural zeolite (clinoptilolite) to treat contaminated water and second we patterned PVA nanofibers in nano rods and labeled them with radiotracer (2-[18F] fluoro-2-deoxy-Dglucose ([18F]FDG)) and closed them in microfluidics chip for the testing of positron emission tomography (PET) radiopharmaceuticals. When fluid baths these nano roads emit positrons and they bind with radiotracer. Radio signals are detected by dosimeters. Our nanofibers system showed a significantly enhanced ions exchange absorption by clinoptilolite, for the treatment/decontamination of water contaminated with radionuclides e.g.134Cs,137Cs and detected radioactivity signal when radioactive fluid injected in microliters. This technology can help to clean drinking water and detection of radioactive compound with very small volume of sample and reduce exposure time.

Primary author: QASIM, Muhammad (Gachon University Seongnam-Si South Korea)

Presenter: QASIM, Muhammad (Gachon University Seongnam-Si South Korea)

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