

Energy Colloquium

The Modern Nuclear Chemistry

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ABSTRACT:

Nuclear or radiochemistry is a relatively young branch of science (120 years) however very few or even no “pure” radiochemical issues remain unsolved. This makes nuclear chemistry a true interdisciplinary branch of science linked with energy and environment sciences, green technologies, geoscience, analytical chemistry, medicine and pharmacy and even social science. I would try to show the main trends in radiochemistry R&D through several examples in which combination of advanced techniques with radiochemical methods results in a new technology development or some phenomenon understanding. First example deals with the cleanup of the nuclear legacy sites for which cheap and effective remediation technologies should be applied. The application of various technologies is based on the chemical speciation of radionuclides present in the samples. Such speciation studies require the application of advanced techniques like HRTEM, XAFS, SIMS, etc. My examples are based on the data that were obtained at the contaminated sites of Russia and USA with focusing on the challenging issues that remain unsolved. The second example deals with advanced separation technologies that are required in nuclear waste management in nuclear power production. The combination of quantum chemical calculations with modern organic chemistry, structural chemistry and radiochemistry have resulted in the advanced technology development for separation of chemical elements with very close chemical properties (rare earth elements, Eu/Am/Cm, etc.). The third example describes the current status of nuclear medicine, isotope production and synthesis of radiopharmaceuticals for target delivery. For successive development of the nuclear medicine the broad interdisciplinary collaboration between nuclear physics, engineering sciences, radiochemistry, analytical chemistry, biochemistry and cell biology is required. I will demonstrate one example on how advanced radiopharmaceuticals with target delivery for tumor theranostics is developed.

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Colloquium schedule and information on how to get to the colloquium can be found at <http://www.skoltech.ru/en/energy-colloquium/>