

Contribution of Lomonosov Moscow State University

Vladimir Petrov

Few words about MSU (est. 1755)

40 Departments

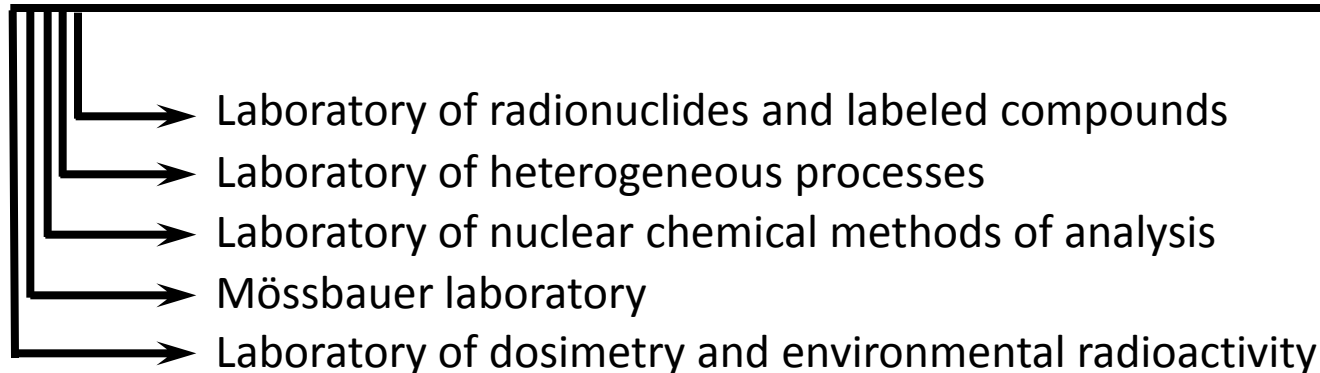
**Department of Chemistry
(17 divisions)**

**Division of Radiochemistry
~ 80 employees
5 laboratories**



Radiochemistry Division

(head of div. Dr. Stepan Kalmykov)



- Hot laboratory,
- Cold laboratory (ISO 17025 certificate),
- Counting room (3 HPGe detectors including 1 with Be window, LSC, alpha spec, ...),
- Offices

Analytical capabilities to work with “hot” samples in MSU

- Hot lab space to work with up to 30 g of ^{239}Pu ,
- 300 kV HR- field emission transmission electron microscope with the resolution of 0.17 nm,
- Synchrotron source at RCC “Kurchatov Institute”, 2.5 GeV, Current 120 mA, Vigler beamline, (XANES, EXAFS, XRD, HEXS, SAXS).
- Nanosizer Nano-ZS (Malvern),
- SIMS,
- TRLIF, etc.
- ESI-TOF-MS

MSU Participation in the BELBaR project

WP 2 (Erosion): 6 PMs

WP 3 (Colloid radionuclide & host rock interaction): 8 PMs

Stepan Kalmykov

Irina Vlasova

Vladimir Petrov

Natalya Kuzmenkova

WP2: Bentonite erosion

The mineralogical characteristics of
the Khakassiya bentonite sample

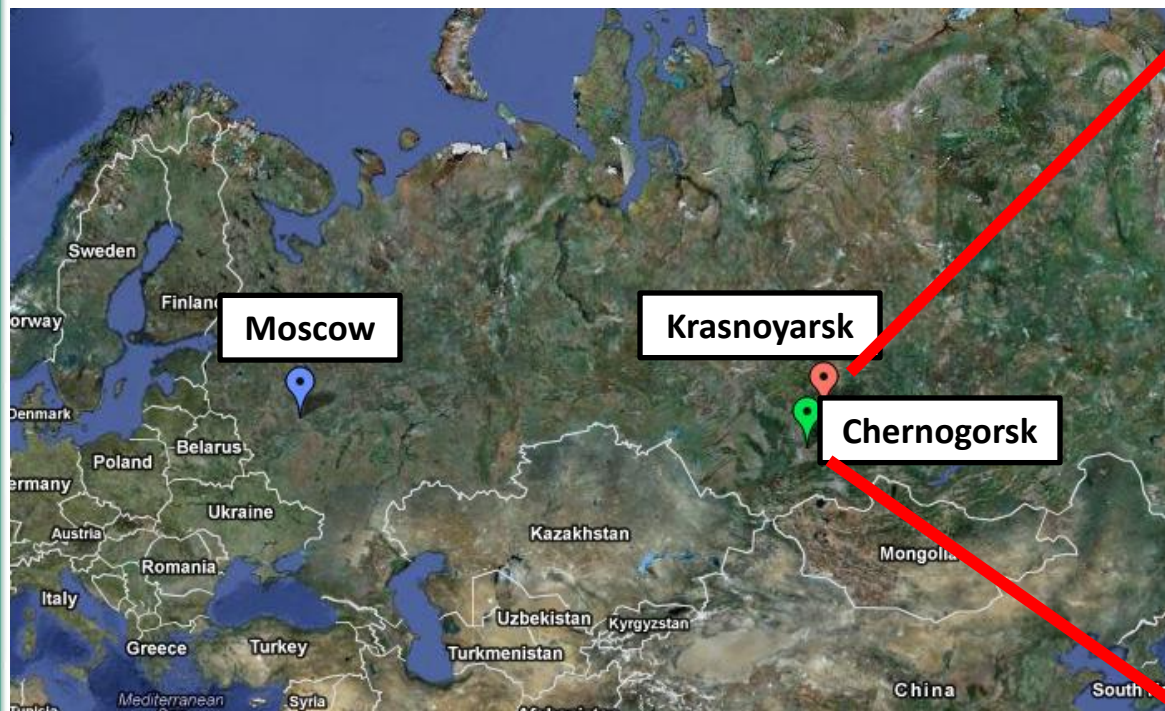
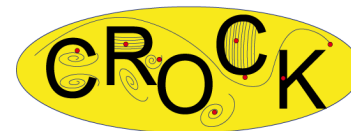
Mineral	Weight content, %
Montmorillonite	70-80
Quartz and Kristobalite	10-12
Albite	4-6
Calcite	2-3
Hematite and Magemite	<2
Pirofilite	1-2

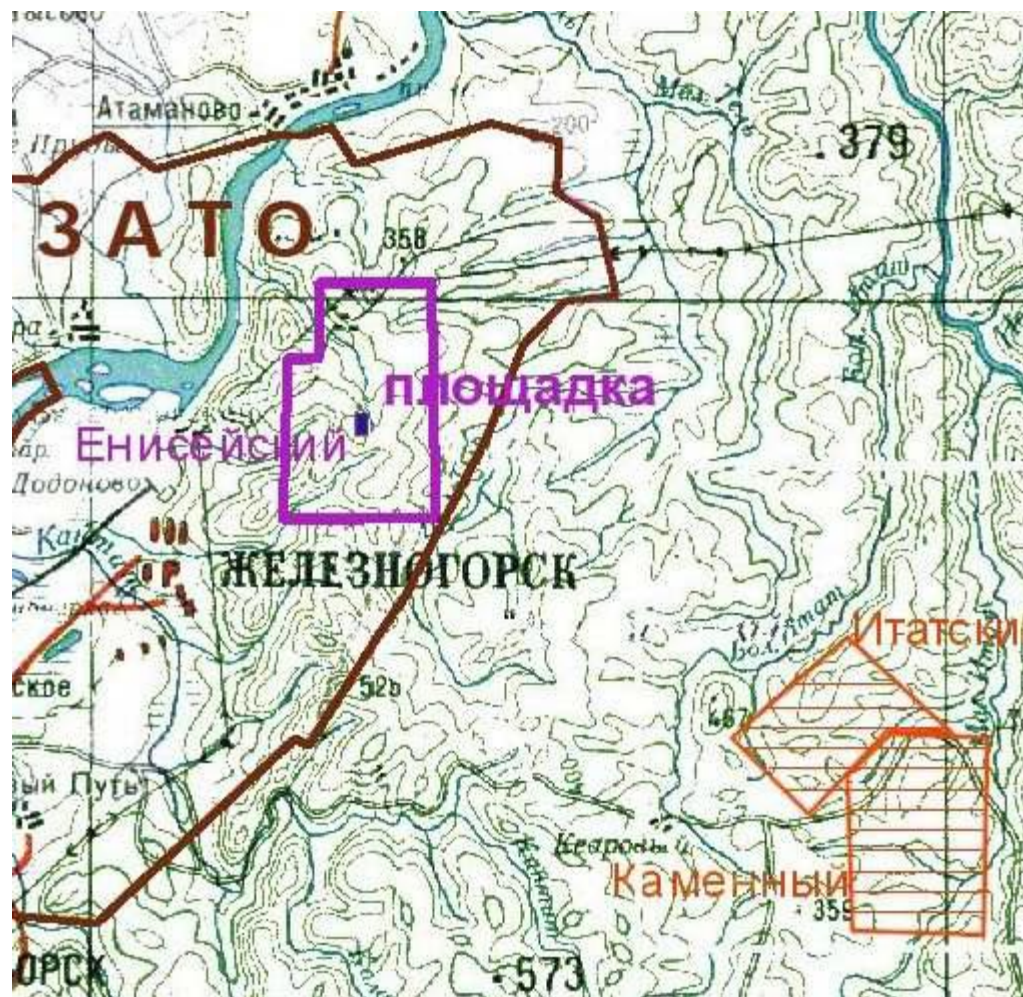
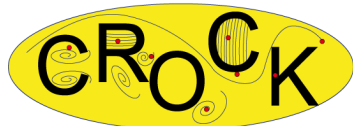
Formation of colloids upon interaction with
MQ water and various groundwater
(Niznekansky rock massive, Tomsk, Mayak)



- PCS and LIBD.
- chemical analysis (ICP-MS, IC, etc.)
- HR-TEM
- HAADF-STREM
- EDX, SAED

Location





WP3: Colloid radionuclide & host rock interaction

Interaction of bentonite colloids with RNs and thin slices of host rocks collected from the proposed SNF and HLW repositories in Russia

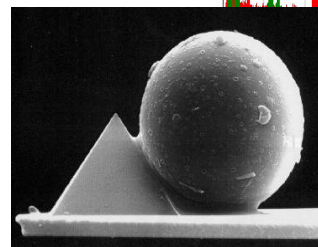
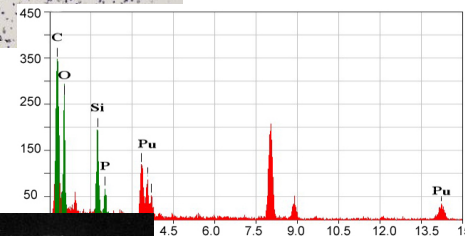
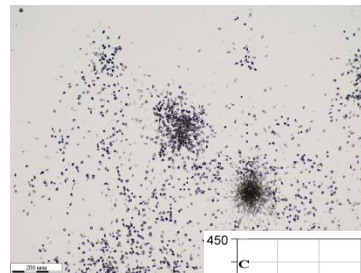


Methods for localization and characterization

- Alpha-track analysis
- SEM-EDX
- AFM

Modelling

- The experimental data will be modeled in terms of DLVO theory



RNs: Cs, Sr, Tc, Np, U, Pu, Th, **Eu**
f(I, pH, T, GW composition)



Behaviour of redox-sensitive RNs

The composition of the aqueous solution equilibrated with bentonite

Component	Concentration, ppm
F ⁻	1
Cl ⁻	12.6
NO ₃ ⁻	6.3
SO ₄ ²⁻	45.4
Br ⁻	0.95
CO ₃ ²⁻ / HCO ₃ ⁻	50
Na ⁺	310
K ⁺	13.3
Ca ²⁺	9.3
pH	6.78
Eh, V	-0.150