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## Dating of Uranium Materials by Using Combination of ICP-MS and SIMS

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The age of nuclear and some other radioactive materials can be determined undoubtedly by using ICP-MS techniques. But it can be correct if only one nuclear or another radioactive material is presented in analyzed sample and no isotope-chronograph presented in background particles in significant quantities.

For particle analysis, which can be implemented by using SIMS, these restrictions are not valid. Practically one particle always characterizes only one material and does not contain background isotopes-chronographs. But age determination is based on the result of measuring of the content ratio of Th230 and U234. The difference of ionization coefficients of uranium and thorium and dependence of these coefficients on composition of particle does not allow using this method directly for age determination.

Nevertheless SIMS is useful for dating of uranium materials, especially if the sample can contain small amounts of different materials. In this case the analysis of different fragments of materials by SIMS can confirm or not confirm the result, had been obtained by ICP-MS. If all detected and analyzed particles and fragments will have the same ratio of ion currents of Th230 and U234, the result of ICP-MS is true. If particles and fragments will have different ratios the result of ICP-MS cannot be related to any of presented materials.

But in the last case the ages of different materials can be still estimated if different fragments have different ages, but the same elemental composition. The "age" had been determined by ICP-MS can be correlated with the average ratio of ion currents of Th230 and U234 had been determined by SIMS for all analyzed particles or fragments. This correlation determines the ratio of ionization coefficients of uranium and thorium, which should be the same for particles with the same elemental composition.

### Country or International Organization

Russian Federation

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