Investigation of the conversion from condensed CeO_2 to vapour flow and its deposition for plasma separation applications

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One of the methods for processing spent nuclear fuel (SNF) is plasma mass separation, which involves three main stages: the conversion of a solid or gas substance into a plasma; the separation of charged particles in space; and the deposition of separated streams [1]. The technological requirement for the final stage of separation is to create conditions that ensure sticking efficiency which approaching 100% [2]. This paper presents the results of studying the conversion of CeO_2 samples, a material that can simulate the primary component of SNF (UO_2), into a vapour flow by using a laser method, followed by its deposition on different substrates. The experiments were carried out on samples with an optimal mass ratio between vapour and coarse phase. Data on the sputtered CeO_2 coatings obtained using a profilometer provided information about directional diagram of the vapour flow and sticking coefficients on the substrates.

[1] Liziakin G *et al.* 2021 *Journal of Physics D: Applied Physics* **54** 414005

[2] Antonov N N *et al.* 2016 *Applied Physics* 70–74