Development of Cerium-Neodymium Oxide surrogates for Americium Oxides.

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Abstract. The form of Am-241 fuel for European radioisotope power systems (RPSs) is expected to be fundamental to their performance. The influence of americium oxide particle shape and size on sinterability and thermal power density will need to be assessed. Part of this assessment will require oxide surrogates with various shapes and sizes to be sintered. The National Nuclear Laboratory (NNL) team are considering the production and use of an americium oxide of the form AmO_{2-X}. The Ce-Nd oxide solid solution system is proposed as a potential surrogate for such americium oxides. An investigation has been conducted to identify if such a surrogate with a specified stoichiometry can be created and to understand the effect of the variables of the synthesis route on particle properties, with the objective of producing particles with a range of properties. The standard methods of oxalate coprecipitation and subsequent thermal decomposition (calcination) have been used. Numerous analytical techniques were required to verify Ce-Nd oxide solid solution production and to characterize its composition. The effect of temperature and stirring rate of the coprecipitation process on particle morphology and size is presented, as well the influence of calcination process on subsequent oxide particle properties. An insight into these initial results is communicated.

Keywords: americium, cerium, neodymium, oxide, space applications.