

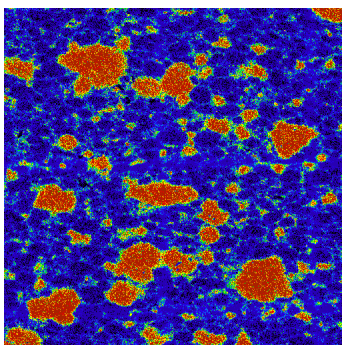
Process for producing nuclear pellets of the MOX type

Description

Industrial fabrication of oxide nuclear fuels for Light Water Reactor (LWR) applications relies on processes involving powder milling, mixing, pellet pressing and thermal treatment. The present invention relates to one of these processes, called MIMAS, consisting in milling U-Pu oxide and then diluting it with UO₂ to give MOX with the desired Pu content. The final product of this process is chemically heterogeneous, which leads to two major disadvantages:

- The power produced is localised in the Pu rich particles, inducing greater local damage of the material and higher fission gas release;
- Following irradiation, the dissolution of the spent fuel in nitric acid for reprocessing is impeded by less soluble Pu-rich regions.

This invention consists in an innovative process for the fabrication of MOX nuclear fuel with an homogeneous Pu distribution in the (U,Pu)O₂ phase of the pellets. The MIMAS type fuel is homogenised by the addition of aluminosilicate (Al₂O₃-SiO₂) to facilitate the diffusion of U and Pu between the UO₂ and (U,Pu)O₂ phases. Moreover, the aluminosilicate increases the grain size of the (U,Pu)O₂. The process utilises conventional powder metallurgy routes to form the primary blend made of Uranium and Plutonium oxides. The secondary blend is formed by dilution with depleted UO₂, and by the addition of the aluminosilicate at that stage.



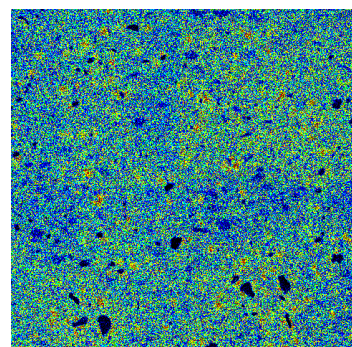
MIMAS fuel

Areas of application

- Nuclear fuel for Light Water Reactor application
- MOX production

Innovative aspects and main advantages

- Homogeneous distribution of Pu throughout the material
- Better in-pile performance in the reactor
- Higher burn-ups of the fuel



MIMAS fuel with 500ppm Bentonite

Stages of development

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Patent pending EP03101559.7

Pilot tests conclusive

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