A Survey of Accident Tolerant Fuel Composed of Uranium Dioxide Sintered with Graphene Nanoplatalet.

Reference	Presenter	Authors (Institution)	Abstract
03-015	Daniel de Souza gomes	gomes, D.S. (Instituto de Pesquisas Energéticas e Nucleares);	Global energy demanded should grow by 30% between today and 2040, and nuclear capacity will expand on 83%. Forecast scenarios point out that developing countries will invest in increasing their energy capacity by 45%. Today, nuclear power generates around 11.2% of global electricity, also considered as carbon emissions-free. Humanity must face various challenges to nuclear energy production because of safety operations conditions. In 2011, it started strategic plans, as accident tolerant fuel (ATF) sponsored by government agencies, industries, and universities. ATF introduced concepts that represent enhanced thermal conductivity, improved mechanical response, and radiation stability. It should replace the conventional UO2, also extend the copy time for accident scenarios. Nowadays, it grows the application of carbon materials for electronic devices, aerospace, and nuclear technology. Graphene platelets diffused in UO2 can enhance thermal conductivity around 30% and improve mechanical strength. Using nanocarbon dispersion on the uranium matrix can achieve a lower thermal gradient. The route adopted the spark plasma sintering technique to avoid the graphitization of carbon atoms. At present, the sintering of UO2 may take up a few hours, high temperatures, and energy to furnaces. Graphene is a two-dimensional honeycomb lattice of carbon atoms. Carbon nanotubes are cylindrical shapes, showing diameters of 1-3 nm, formed by graphene sheets. The calculation of the performance of UO2-Graphene used a fuel system with many physical properties updated. UO2-Graphene shows enhanced thermal conductivity and increased the capacity to keep fission gas releases into ceramic fuel.

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