The Phenomenology of Nuclear Fuel

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Abstract

This by far most widely used nuclear fuel is in the form of Uranium Oxide. It is used in hundreds of nuclear power reactors, naval reactors and research reactors. This ceramic fuel form has been studied and refined over the last six decades and is therefore well understood. Nevertheless, the desire to continue to optimize its performance has uncovered some to unknown phenomena. During the early years of the nuclear age many different fuel concepts were considered and tested, ranging from liquid to solid metal alloys to high temperature ceramics other than oxide, applicable to coolant media from water to liquid metal and gas. The basic phenomena controlling the in-reactor behavior of these fuels and the possible application of these concepts for future reactor designs will be discussed.