

Thorium oxide-based fuels: historic notes, ongoing research and future trends

Marc Verwerft

SCK•CEN (Belgian Nuclear Research Centre)
Institute for Nuclear Materials Science
Boeretang 200, BE-2400 Mol, Belgium

Abstract

Thorium has recently been presented in the popular press as “the green future of nuclear” and it might seem as if thorium based fuel cycles are a recent breakthrough that remained overlooked for decades. Alas, this is not the case: research on thorium as possible alternative resource for nuclear energy applications has a long history and it is hardly possible to account of all the accomplishments achieved over more than five decades of research on thorium fuel cycles. In this presentation, a brief summary will be given of the historic Light and Heavy Water Reactor thorium fuel research. Most of the early work was performed with the aim to achieve a thorium-uranium breeding cycle. Around fifteen years ago, several European research projects were launched to investigate the use of thorium-plutonium fuels in Light Water Reactors with the goal to reduce plutonium inventories. An overview will be given of the ongoing research in this more recent domain with an emphasis on materials research and solid state aspects. Some thoughts on the possible implementation of a thorium-plutonium based fuel cycle will be discussed.