A REVIEW ON ZIRCONIUM-ALLOY-BASED COATING SUBSTITUTES FOR FUTURE LWR FUEL CLADDING DESIGN

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Major concerns of Advanced Light Water Reactors (ALWRs) and Generation IV reactor concepts are based on the kind of materials involved in the cladding of the fuel operating at higher temperature compares to the existing LWRs. The future nuclear fuel cladding ought to meet the following design specifications such as tolerable chemical compatibility, corrosion resistance, tolerable strength, ductility, fatigue cracking, toughness, creep fatigue interaction, helium embrittlement in the presence of coolants and process fluids [1]. Nuclear fuel cladding materials necessitates absolute robustness to prevent accidents related to mechanical failures. Coating of material surfaces can improve the properties and extend the longevity of the materials from harsh conditions in various fields of application. This study features some selected materials including Silicon Carbide (SiC), Chromium (Cr), Molybdenum, and Austenitic Stainless Steel (AISI-348) deposition on Zr-based alloy for cladding purposes. The research also discussed the materials strength and challenges towards the 3D printing employed to ensure their integrity under the harsh reactor condition [2]. The findings involved in this study will help to throw more light on deposition techniques that will be engaged in the fabrication of future LWR cladding components including some of the challenges that need to be overcome in order to achieve cladding safety, sustainability and economics as part of the Gen. IV reactor concept goals [3].

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CONTROL OF BACTERIAL SENSITIVITY TO QUINOLONES BY MAGNETIC MAGNESIUM ISOTOPE ^{25}MG

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First magnetic isotopes effects on biological objects were demonstrated in experiences with the phosphorylating enzymes and magnesium isotopes [1]. Magnesium possesses three stable isotopes: ^{24}Mg, ^{25}Mg and ^{26}Mg; of them only ^{25}Mg has a magnetic nucleus (spin I=5/2). Participation of the magnetic magnesium isotope ^{25}Mg stimulates the synthesis of ATP and inhibits the synthesis of DNA [1]. *In vivo* experiments on *E. coli* bacteria showed that microorganisms are sensitive to presence of the magnetic magnesium isotope [2]. The mechanism of these effects was explained by the magnetic nucleus participation in enzymatic process with electron transfer. The