EVALUATION OF ZRO_2-BASED NANOFILMS AS PROTECTIVE LAYERS IN RADIOACTIVE WASTE CONTAINERS: AN INVESTIGATION OF STRUCTURAL, OPTICAL AND ELECTRICAL PROPERTIES

AML AIED ALMUTERY *(PhD. Student, Shaqra University, Riyadh-Saudi Arabia)*
Scientific supervisor: Marwan F.S.H. AL-Kamali, Ph.D., Associate Professor

Relevance: Ensuring the secure confinement and proper disposal of radioactive waste holds paramount significance in safeguarding both human wellbeing and the environment. The nuclear technologies are extensively used in various domains such as energy, medical science, manufacturing, agriculture, and more. The high-level nuclear waste it produces, though, has a very lengthy decay time, high radioactivity, and high toxicity [1]. Effectively and sensibly managing nuclear power is the most challenging issue faced by any country that seeks to develop it. . The disposal of radioactive waste has been addressed in a number of ways, including deep burial, storage under the sea, storage in space, and ice treatment. Deep geological disposal is presently considered the optimal choice for many countries. For deep geological disposal, a "multi-barrier system" is envisioned, including packing materials (container), buffer materials, and surrounding rock.

Goal of the work: In this context, this research studying aims to investigate the potential of nano-thin films of pristine and doped ZrO_2 as protective layers in radioactive waste containers using the sol-gel method.

Result analysis – In this context, to investigate the potential of ZrO_2-based nanofilms as protective layers in radioactive waste containers. The key findings of the current study may lead to optimize and design the innovative technologies to secure the radioactive waste storage and other potential applications including energy, environmental protection and corrosion-resistant coating in numerous industrial zones.The expected results of using a ZrO_2-based film in a radioactive waste container would depend on various factors such as the type and concentration of radioactive material, the size and shape of the container, the thickness of the film, and the duration of the storage. Generally, the ZrO_2-based film should provide an effective barrier against the release of radioactive material from the container and prevent corrosion or degradation of the container material.

Conclusion. By the conclusion of this study, an effective solution will be found to the problem of nuclear radiation leakage from containers containing radioactive waste.

Литература

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