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Assessment of glassy carbon as a high-level nuclear waste containment material

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The world is experiencing an ever-growing demand for energy. This coupled with the demand to decrease the carbon-footprint have led to a reconsideration of nuclear power as an alternative to fossil fuel power stations. Many countries have either started again to build nuclear power plants while others, like South Africa, are planning to build ones in the near future.

One of the most negative aspects of nuclear power plants is the long term storage of radioactive nuclear waste. The type of container material and containment materials and methods are still issues being actively researched. Presently borosilicate and phosphate glasses are the preferred materials for capturing high-level radioactive in a solid matrix. This waste is then stored in multi-walled stainless steel chambers. A favoured method is to then store these in containers in geological stable sites like Vaalputs in the Northern Cape. These containers must fulfill a number of criteria, such as a high resistance against radiation damage from the radioactive waste, chemical-resistance against corrosive materials, thermally conductive to dissipate the heat generated by the nuclear decay processing happening in the waste, a diffusion barrier for the radioactive waste in order not to contaminate the environment, etc.

Glassy carbon, also known as vitreous carbon or as polymeric carbon, is a relatively new form of carbon with many properties completely different to the common graphite form of carbon. This talk will argue the case that glassy should be considered as a container material for the (solid) nuclear waste in stead of the usual metallic (such as steel) materials. Some of the research being done at the University of Pretoria will also be presented.

Level (Hons, MSc, PhD, other)?

Other

Consider for a student award (Yes / No)?

No

**Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?**

Yes

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