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Australian Nuclear Science and Technology Organisation

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ANSTO responds to concerns about ceramic waste forms

It is wrong to conclude that research recently published in *Nature*^{*}, which showed the extent of radiation damage in zircon, cast doubts over the ability of ceramic materials such as synroc to safely immobilise radioactive waste.

According to Dr Bruce Begg, manager of the synroc project at ANSTO^{**}, the work, although scientifically significant, has no practical impact on the use of synroc or other ceramic waste forms for a number of reasons.

“Firstly, zircon, which is totally unrelated to the similarly named synroc material ‘zirconolite’, is more susceptible to radiation damage than the minerals that make up synroc. Titanate minerals such as zirconolite and pyrochlore were chosen as the basis of synroc because of, among other things, their superior radiation tolerance, stability in nature and ease of fabrication over silicate minerals, such as zircon.

“Secondly, the work only focused on the impact of radioactivity on the structure of the material. It did not determine whether the observed changes in the structure had any impact on its ability to lock up radioactive waste.

“Ultimately what is important is not whether a waste form has an ordered or irregular structure, but how well it imprisons high level waste,” said Dr Begg.

Dr Begg also explained that several international studies have shown that the structural changes that radioactivity induces in the synroc phases zirconolite and pyrochlore have no detrimental impact on their ability to retain the radioactive material when subject to accelerated leaching tests.

“Together with international colleagues we have also conducted extensive studies of natural minerals containing the synroc phases and can see how they have withstood the impact of radiation damage and natural weathering processes over geological timeframes and survived.

“Based on the extensive research and development carried out at ANSTO and around the world, we are satisfied that the family of synroc phases designed to lock up radioactive waste can withstand the test of time whilst the radioactive waste that it is designed to store decays away.” concluded Dr Begg.

More information and to arrange interviews please call Sharon Kelly, Media Adviser on (02) 9717 9575 or 0400 395 085

^{*} Farnan, I., Cho, H. & Weber, W. J. *Nature* **445**, 190–193 (2007).

^{**} ANSTO is the Australian Nuclear Science and Technology Organisation, the country’s national nuclear research and development organisation and the centre of Australian nuclear expertise – over 70 per cent of all radioisotopes used in Australian nuclear medicine are made in ANSTO’s reactor.