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# Measurement of the cosmogenic isotope 10-Be at iThemba LABS and applications of cosmogenic isotopes in South Africa

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10Be is an important isotope for accelerator mass spectrometry system of iThemba LABS in Johannesburg, because of local demand for cosmogenic radionuclide dating methods in the local earth science and paleo-sciences community. This demand also meets a very suitable basic AMS setup with its ion-source based on a version of the Cesium Sputter source of the Lawrence Livermore National Laboratories, which delivers significantly higher output of BeO- than commercially available ion sources. The measurement of 10Be by accelerator mass spectrometry requires the effective suppression of 10B before the detector, which is either done by using an gas absorber cell for full stopping of 10B, or by differential energy loss of 10B versus 10Be in an absorber foil (post-stripping) followed by a high-resolution magnet or electrostatic analyser. The latter method has proven effective in that the 2+ charge state can be utilized, which has in excess of 40% charge state transmission at 4MV terminal voltage, but there are charge state losses from the absorber foil. Using gas absorber cell employing havar windows usually requires higher energies, requiring the 3+ charge state and higher terminal voltage, resulting in additional interference from the 10B(p,)7Li reaction that is not fully separated in the detector. Recently it has been shown that low stress silicone nitride membranes can be used as absorber for full stopping with particle energies of 6MeV for 10-Be. This allows for the use of the 2+ charge state, avoids the charge state losses of the post-stripping method, and – provided the chosen terminal voltage is low enough – it avoids incurring massive interference from the nuclear reaction. We implemented this method in lieu of the traditional gas absorber cell, thus cashing in on the efficiency gain from using the 2+ charge state. Together with the efficiency benefits of our ion-source we have a high detection efficiency AMS system for 10Be. We applied the foilstack methods successfully in test runs and recently in first projects of our cosmogenic isotope programme.

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