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**Study of an MeV Nuclear Resonance to Increase Sodium Detection by Ion Beam Analysis** ABIJITH KRISHNAN, NITHIN KANNAN, Arizona State University Physics Dpt./BASIS Scottsdale HS, TIFFANIE S. CAPPELLO-LEE, RACHEL A. NEGLIA, Arizona State University Physics Dpt./Tempe Preparatory Academy, M. W. MANGUS JR., R. J. CULBERTSON, NICOLE HERBOTS, Arizona State University Physics Dpt., B. J. WILKENS, ASU Leroy Eyring Center for Solid State Science, C. F. WATSON, SiO2 NanoTech LLC, SIO2 NANOTECH LLC COLLABORATION — Blood percolation into implanted glucose sensors for diabetics limits sensor lifetime to 3-7 days. $Na^+$ mobile ions from blood permanently damage Si-based devices. Ion Beam Analysis (IBA) can detect Na in sensors. However, due to the low atomic number of Na (Z=11) and low mass ratio of Na to Si, Na that has percolated into implanted sensors is difficult to detect via standard 2 MeV $^4$He Rutherford backscattering. Nuclear resonance can increase the Na scattering cross-section. This work characterizes a $\sim 4.7$ MeV resonance, annotated $^{23}$Na($\alpha$,$\alpha$)$^{23}$Na, between $^{23}$Na atoms and $\alpha$ particles. To increase precision of measurements for resonance energy, width, and factor, ion beam energy is calibrated via 3 signals: $5.486 \pm 0.007$ MeV emission of $\alpha$ particles by $^{241}$Am, and two nuclear resonances, $4.265 \pm 0.055$ MeV $^4$He with $^{12}$C, and $3.038 \pm 0.003$ MeV $^4$He with $^{16}$O. The $^{23}$Na($\alpha$,$\alpha$)$^{23}$Na nuclear resonance is found to have an energy of $4.696 \pm 0.180$ MeV and cross-section increase of $41 \pm 7.0\%$. Increase of Na detection in IBA via the studied resonance is statistically significant. Future research can determine if the cross-section increase is sufficient for Na detection in glucose sensors.

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