Abstract Submitted
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Hermetic Nano-Bonding^{TM}and Surface Characterization for Medical Implants and Marine and Air Sensors[1] ENDER DAVIS, NICOLE HERBOTS, SHAWN WHALEY, ROSS BENNETT-KENNETT, ROBERT CULBERTSON, AUSTIN CAUSEY, Arizona State Univ, ROB RHOADES, SCOTT DREWS, Entrepix Inc, CLARIZZA WATSON, SiO2 NanoTech, J. "DOC" BRADLEY, DAVID SELL, PETER REZ, BARRY WILKENS, Arizona State Univ, THE NANOBONDING EXPERIENCE TEAM — Sodium percolation deteriorates diabetics' "permanent" glucose sensors in days. Nano-Bonding^{TM}could allow them to last over two years. Nano-Bonding grows molecules between surfaces to create a hermetic bond, and has applications in single-device medical implants, marine and air sensors, solar panels, night vision goggles, and more. Nano-Bonding [1,2] uses β-cristobalite-like $Si_2O_4H_4$ on Si(100) as a precursor phase to cross-bond silica and Si across 20-30 nm-wide atomic terraces. Annealing occurs below 180 °C under steam pressurization. The Herbots-Atluri process [1] nucleates precursor phases like $Si_2O_4H_4$, which react at low temperature. $Si_2O_4H_4$ reacts with hydrophilic, oxygen-deficient phases, forming cross-bonding inter-phases. Surfaces are characterized after each of these steps: forming the precursor phase, nano-contacting, Nano-Bonding, and de-bonding. Bonding strength correlates to topographies measured by Tapping Mode Atomic Force Microscopy, and 3 Liquid Contact Angle Analysis with the Van Oss theory. An atomistic model is proposed. [1] US patent 6,617,637 (2003), 7,581,365 (2010). [2] N. Herbots et al. Pub. No 13/259,278, PCT/US2010/033301 (2012).

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