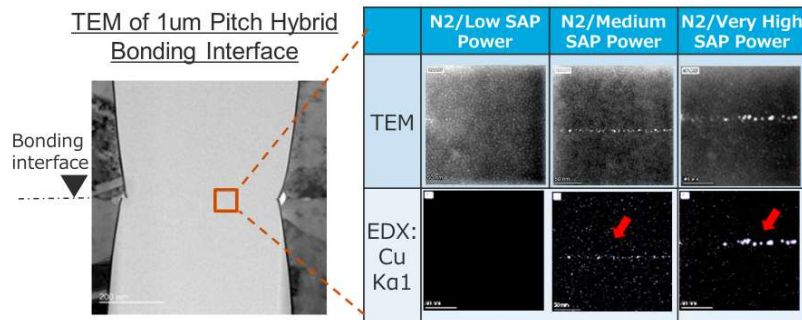


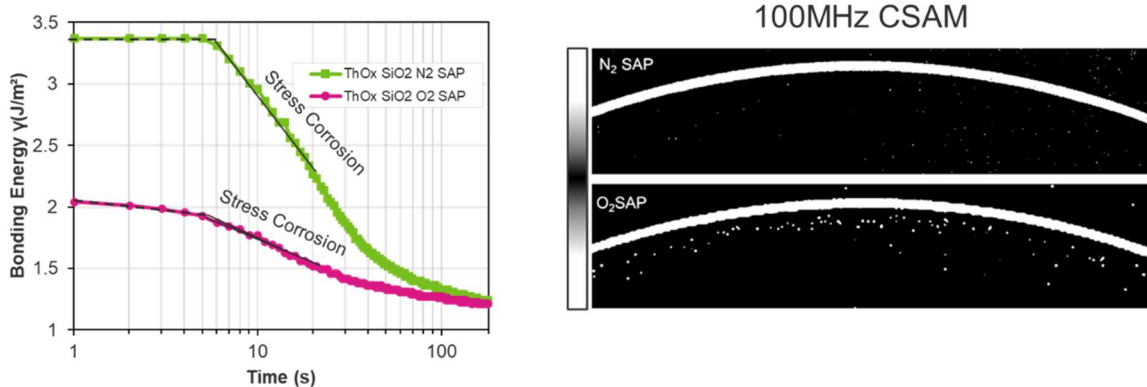
Optimization of Dielectric Plasma Activation for Wafer to Wafer Fusion Bonding

Christopher Netzband¹, Andrew Tuchman¹, Ilseok Son¹, Angelique Raley¹

¹Tokyo Electron Technology Center America, LLC, 255 Fuller Rd, Albany, NY, U.S.A. 12203



Impact of Cu sputtering on plasma activation power in a 0.5um pitch hybrid bonding structure. Even medium power causes sputtering that acts as a leakage pathway in the device. (Tuchman A.; Noda, K.; Hoshino, S.; Nagata, A.; Kohama, N.; Kondo, Y.; Son I., (2024, March 21). *Preventing Yield Loss from Plasma Induced Copper Sputtering in <0.5um Pitch Hybrid Bonding* [Poster Presentation]. IMAPS DPC 2024, Phoenix, Arizona)



Impact of different Plasma activation gasses on thermal oxide bonding. While N₂ gas shows very high bond strength and a long stable window before the onset of stress corrosion, O₂ gas has a 60% lower strength and a stable region that is both shorter and exhibits small amounts of corrosion within it indicating excess water at the bonding interface. This is corroborated by CSAM showing increased Joule-Thompson voiding at the wafer edge for the O₂ case. (Tuchman, A.; Hoshino, S.; Gildea, A.; Netzband, C.; Son, I., (2024, March 19) *A Novel, Automated Measurement and Analysis Technique for Bonding Energy of Fusion and Hybrid Wafer to Wafer Bonding* [Conference Presentation]. IMAPS DPC 2024, Phoenix, Arizona)