Protective SiAlON Coating with Embedded High Temperature Corrosion Sensor

S.B. RIVERS, Rhode Island College, J.I. KRASSIKOFF, G. BERNHARDT, C.J. BOCCHINO, R.J. LAD, University of Maine — We have fabricated oxidation resistant and wear resistant SiAlON films by RF magnetron cosputtering of Al and Si targets in Ar/O$_2$/N$_2$ mixtures. The SiAlON films are amorphous, extremely smooth, and have very low oxygen permeability making them extremely attractive as passivation layers on a variety of sensors and other microelectronic devices used in high-temperature oxidizing environments. To analyze the performance of these films as passivation coatings, we incorporated a corrosion sensor at the SiAlON-substrate interface to monitor oxygen penetration through the coating. This corrosion sensor is a serpentine metal pattern. The conductivity changes as a function of time are monitored giving an in situ quantitative measure of the oxidation rate of the metal sensor due to oxygen diffusion through the SiAlON film.