NOVEL PRECURSORS FOR HIGH K DIELECTRICS AND METAL ELECTRODES PART II: DEPOSITION

Jim D. Atwood, David C. Hoth, Debra A. Moreno
Department of Chemistry, University at Buffalo
Natural Sciences Complex, Buffalo, NY 14260

Cynthia A. Hoover, Scott H. Meiere, David M. Thompson, George B. Piotrowski, Michael M. Litwin, and John Peck
Praxair Electronics
PO Box 44, Tonawanda, NY 14151

Thin-film deposition and characterization using novel precursors was performed. Organometallic precursors, containing platinum and ruthenium, were synthesized at greater than 99% purity. Platinum films were deposited using (isopropylcyclopentadienyl)trimethyl platinum and oxygen. The resulting films were fully coalesced (i.e. no pinholes) at a thickness of 25 nm, and had a resistivity of 20 μΩ cm. Ruthenium and ruthenium dioxide films were deposited using oxygen and (methylcyclopentadienyl)(ethylcyclopentadienyl) ruthenium. Adjusting the ratio of oxygen/precursor in the process gas controlled the amount of oxygen incorporated in the film. Deposition of ruthenium films was conducted at 450 ^{o}C. Metallic films were generated at an oxygen/precursor ratio of 50. The resulting films exhibited low resistivity, approximately 20 μΩ cm.