Growth and electrical properties of organic-inorganic alloy films grown by molecular layer deposition from trimethylaluminum, pentanediol and water

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Organic-inorganic alloy films were deposited onto p-type silicon substrates by using molecular layer deposition (MLD) and atomic layer deposition (ALD) for organic and inorganic layers, respectively, from trimethylaluminum, pentanediol and water. Composition of the alloy films were adjusted by controlling the numbers of cycles in ALD and MLD, respectively. Electrical properties of the alloy films were evaluated on Au/alloy/p-Si capacitors by capacitance-voltage (CV) and current-voltage (IV) measurements. Increasing the number of layers or the thickness of ALD Al_2O_3, the alloy films showed a lower leakage current density. Dielectric constants of alloy films were smaller than that of ALD Al_2O_3. Interestingly it is observed that clockwise hystereses in the CV curves were reduced as the portion of Al_2O_3 in the alloy film was increased. Here we will discuss a potential application of the alloy film as a charge trap layer in flash memory.