EuroSciCon

18th Edition of International Conference on

Emerging Trends in Materials Science and Nanotechnology

January 28-29, 2019
Barcelona, Spain

Raffaella Lo Nigro, Nano Res Appl 2019, Volume 5
DOI: 10.21767/2471-9838-C1-030

Atomic layer deposition growth of laminated oxides as dielectric thin films

Raffaella Lo Nigro
Istituto per la Microelettronica e Microsistemi - CNR, Italy

Wide bandgap semiconductors (SiC or GaN) based devices have shown excellent progress in recent years for high frequency and high power electronics. Nevertheless, several issues still needed to be addressed such as finding of an appropriate gate insulator. Moreover, since device frequency performance is strongly dependent on maintaining a high geometric aspect ratio between the gate length and barrier thickness, precise control over the thickness of gate insulators is very important. In this context, atomic layer deposition (ALD) is considered as a key enabling technique because of its controlled layer-by-layer growth. Huge efforts are nowadays devoted to the fabrication of multicomponent gate insulators having high dielectric constants and good chemical stability. In particular, the growth of Al2O3-HfO2 laminated layers is among the most studied combination because of the possibility to combine the complimentary characteristics of the two materials. Plasma enhanced ALD growth of three different Al2O3/HfO2 combinations has been considered: a bilayer system of the two Al2O3 and HfO2 oxides each having a 15 nm thickness, a nanolaminated 10 stacked Al2O3-HfO2 bilayers with each sub-layer thickness of about 3 nm and of a homogeneous HfAlO layer, have been fabricated. The dielectric properties and the structural evolution upon annealing treatment have been compared. On the basis of all the collected data, the 10AB laminated can be considered the most promising system. In fact, it showed an amorphous structure before and after annealing treatments and better dielectric behavior in terms of dielectric constant value and charge traps amounts.

Biography

Raffaella Lo Nigro received her BSc in Chemistry cum Laude in 1996 and in 2000 she received her PhD from Catania University. From 1996 to 2000 she acquired an advanced know-how in the field of MOCVD and in 2001 she joined the IMM-CNR as permanent researcher, where she is responsible of the research group "advanced materials for power devices and their nanocharaterization". Her current research interests include the synthesis of high k dielectric by atomic layer deposition. She is author of more than 120 papers and 4 book chapters.

raffaella.lonigro@imm.cnr.it