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Effect of native oxidized shell on metal nanoparticles fabricated by laser irradiation method for non-volatile memory

JunSeok Lee[1], JungYup Yang[2], JooHyung Kim[3] and JinPyo Hong[1]

[1]Novel Functional Materials & Device Lab., Department of Physics, Hanyang Univ., Seoul, Korea
[2]Power & Industrial Systems R&D Center, HYOSUNG Corporation, Gyeonggi-Do, Korea
[3]Technology Development Center, DongBu HiTek, Gyeonggi-Do, Korea

The effect of native oxidized shell on Al nanoparticles (NPs) for non-volatile nano floating gate memory was investigated. The native oxidized shell was induced by during fabrication of nanoparticles and deposition of control oxide layer by reactive sputtering. Cross-sectional transmission electron microscopy images showed that the Al NPs core and native oxidized shell were clearly embedded in gate oxide layer (high-k HfO2). Capacitance-voltage measurements reliably exhibited metal-oxide-semiconductor behaviors with a large flat band shift. In addition, the charge retention time at room temperature was found to exceed ten years. This enhanced memory characteristics were attributed to the enhanced electron/hole barrier and the interface state through the native oxidized shell on Al NPs.

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Effect of plasma pre-treatment on Cu nucleation on atomic layer deposited Ru during metal organic chemical vapor deposition

김선일, 문학기, 김진성, 이내응

성균관대학교 신소재공학부

In this work, the effect of direct plasma pre-treatment on Cu nucleation was investigated on atomic layer deposited (ALD) Ru by metal organic chemical vapor deposition (MOCVD). The direct plasma pre-treatment was performed on ALD-Ru surface in the inductively coupled H_2/Ar and O_2/Ar plasma. The parameters of direct plasma pre-treatment were gas flow ratios and pre-treatment time. XPS and SEM were used to examine the effect of these parameters. The results show that the Cu nucleation on the Ru surface was suppressed as the hydrogen gas flow ratio, oxygen gas flow ratio and pre-treatment time increase. The implication of suppression by pre-treatment process will be discussed in conjunction of superfilling of high-aspect ratio trench by using Cu MOCVD process.