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Electrical Characterization of Cu_2O Nano-particles embedded in Polyimide

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We had fabricated the nano-floating gate capacitor with Cu_2O nano-particles in polyimide matrix. This polymer layer had a possibility used as tunneling and control layer for nano-floating gate memory structure. The Cu_2O nano-particles in a polyimide film were formed by chemical reaction between copper thin film and polyamic acid[1-2].

The wet oxidation process to form 4.5-nm-thick SiO_2 layer as a tunnel oxide was conducted at 900°C for 2 min on *p*-type Si substrate. The copper films with thickness of 5 nm ~ 10 nm were deposited on *p*-type Si substrates by thermal evaporator. The polyamic acid (PAA) was spin coated 50-nm-thick onto the deposited copper film. The PAA precursor used in this study was prepared by dissolving Biphenyltetracarboxylic- dianhydride-phenylene diamine (BPDA-PDA) commercial polyamic acid (PI2610D) in N-methyl-2-pyrrolidon (NMP). The PAA/Cu layer was held to react with metal layer at room temperature for 24 hours. Finally, the PAA/Cu layers were cured at 300 °C ~ 500 °C for 1 ~ 2 hour after soft baking at 135 °C for 30 min in a N_2 atmosphere.

The morphology of Cu_2O nano-particles formed in the PI layer was characterization by transmission electron microscopy (TEM). For the electrical characterization of Cu_2O nano-particle capacitor, capacitance-voltage measurement systems were constructed with a HP4280A and Boonton 7200 capacitance meter.

[참고문헌]

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