Electrical characterization of charging capacitor in Au nanoparticle organic memory device

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Nanoparticulate materials of semiconductors and metals are currently the focus of intense research. The physical properties of such small-scale structures can be tailored for particular applications. For example, large area electronics, low-cost dispensable sensor arrays, and memory tags on the other hand necessitate the design and development of alternate cost-effective memory solutions. The chemical self-assembly of Au nanoparticles has been reported to show great potential in silicon memory applications. A new organic memory system, using pentacene as the active semiconductor layer and evaporated aluminum or metallic inkjet-printable silver as electrode, was fabricated. SiO2 or polymer is adopted as the dielectric layer. In addition, organically passivated gold nanoparticles was used as charge storage elements. A monolayer of these particles has been incorporated into a metal-insulator-semiconductor (MIS) structure. The MIS device exhibits a hysteresis in its capacitance versus voltage characteristic. Charge storage in the layer of nanoparticles is thought to be responsible for this effect. The charge storage properties of the Au nanoparticles are studied using capacitance-voltage(C-V).