PS-15

Comparative Study on Various Memristor Models

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Memristors have been studied for many years due to better scalability than DRAMs and FLASH memories thus they are considered now as a strong candidate for future memories. To describe the electrical behavior of memristors, various memristor models have been developed. Especially, many kinds of window function have been used to express the non-linearity of memristors which are thought to cause different voltage-current relationships in memristors. In this paper, the previous memristor models with different window functions are compared and analyzed. This comparative study can be very useful in not only understanding the diversity in memristor's electrical behaviors but also developing memristor circuits. This work was financially supported by the SRC/ERC program of MOST/KOSEF (R11-2005-048-00000-0). The CAD tools were supported by the IC Design Education Center (IDEC), Korea.

Keywords: Memristor, Current-voltage model, Window function

PS-16

Highly Stable Photoluminescent Qunatum Dot Multilayers by Layer-by-Layer Assembly via Nucleophilic Substitution Reaction in Organic Media

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We introduce a novel and robust method for the preparation of nanocomposite multilayers, which allows the excellent photoluminescent (PL) properties as well as the accurate control over the composition and dimensions of multilayers. By exchanging the oleic acid stabilizers of CdSe@ZnS quantum dots (QDs) synthesized in organic solvent with 2-bromo-2-methylpropionic acid (BMPA) in the same solvent, these nanoparticles were be alternately deposited by nucleophilic substitution reaction with highly branched poly(amidoamine) dendrimer (PAMA) through layer-by-layer (LbL) assembly process. Our approach does not need to be transformed into the water-dispersible nanoparticles with electrostatic or hydrogen-bonding groups, which can deteriorate their inherent properties, for the built-up of multilayers. The nanocomposite multilayers including QDs exhibited the strong PL properties achieving densely packed surface coverage as well as long-term PL stability under atmospheric conditions in comparison with those of conventional LbL multilayers based on electrostatic interaction. Furthermore, we demonstrate that the flexible multilayer films with optical properties can be easily prepared using nucleophilic substitution reaction between bromo and amino groups in organic media. This robust and tailored method opens a new route for the design of functional film devices based on nanocomposite multilayers.

Keywords: Layer-by-layer assembly, Quantum dot, Photoluminescent multilayers, Nucleophilic substitution reaction