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Interface engineering of CeO_2 nanostructure based memristors

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We report a novel approach to improve the resistive switching performance of metal oxide based memristors. In the first approach, the vertically aligned ZnO (NR) arrays were grown on transparent conductive glass by electrochemical deposition while CeO_2 quantum dots (QDs) were prepared by a solvothermal method. Subsequently, the as-prepared CeO_2 QDs were embedded into ZnO NRs array by dip-coating to obtain CeO_2-ZnO nano-composite. Interestingly, such a device exhibits excellent resistive switching properties with much higher On/Off ratios, better uniformity and stability over the pure ZnO and CeO_2 nanostructures. The origin of resistive switching was studied and the role of hetero-interface was discussed. Secondly, self-assembled CeO_2 nanocubes based resistive switching device was fabricated by hydrothermal process. The device was proven to exhibit excellent resistive switching performance. The origin of switching behaviour on the basis of filament model and inter cube junctions was presented. The present devices demonstrate to have the potential for next generation non-volatile memory applications.

Biography

Adnan Younis received his M.Phil. in Physics from Quaid-i-Azam University, Islamabad, Pakistan in 2009, where he researched high temperature superconductors in the Material Science Laboratory of Nawazish Ali Khan. He is currently a Ph.D. candidate with Prof. Sean Li and Dewei Chu in the laboratory of advanced multifunctional and energy materials at school of Material Science and Engineering, University of New South Wales, Australia. His research interests involve development of metal oxides with their applications in next generation non-volatile memory devices such as resistive random access memories (RRAM).

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