

Stable Resistive Switching Behavior of Layer-by-Layer Assembled Protein Multilayers

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Recently, nonvolatile resistive switching memory (ReRAM) devices are one of the most essential components for mobile electronics such as laptop computer and cell phone etc. Although various studies are reported, particularly ReRAM devices have attracted much interest due to the simple structure and good electrical performance. Here, we introduce a facile and simple approach for the preparation of ReRAM devices by layer-by-layer assembled protein multilayers. Resistive switching behavior of these protein devices are caused by the charge trap/release of Fe^{III}/Fe^{II} redox pairs within ferritin core that induced by externally applied voltage under atmospheric conditions. These devices showed the excellent performances such as ON/OFF current ratio of 10³, fast switching speed, highly stable endurance. Furthermore, in this study, we showed that these ferritins are can be used as a nano-scaled memory devices and their memory performance is dramatically improved by molecular level manipulation.