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하계종합학술대회 초청강연 발표정보

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제 목	Dual filament memristor and its application for spiking neural network
Abstract	Neuromorphic computing has emerged as a new energy-efficient computing paradigm that enables massively parallel analog computing. Artificial neuron and synapse are main building blocks for realizing neuromorphic computing system, and memristive devices are known as promising candidates for artificial synapses in terms of energy efficiency and scalability. Despite numerous investigations in this area, there remains a need for further enhancements in various aspects of memristive devices. In this research, we propose a dual-filament type memristive device consisting of Cu:Te/Te/IGZO/Pt multi-layers for the implementation of more reliable synaptic devices and demonstrate its application for memristve spiking neural network(SNN). Thanks to the dual filament formation, the memristive device exhibited more reliable behaviors in terms of cycle and device variations. Using the developed memristive devices, a further study on implementation of memristive spiking neural network hardware was performed. We adopted a 1T1R synapse unit where the transistor serve as a pre-synaptic node and also as a selector. The optimal design of the CMOS transistor in conjunction with the memristor is one of the key to the memristive SNN. We investigated the influence of the transistor design on the memristor switching behaviors through experiments. We extended the study to the large scale memristive SNN operation and discuss the practical issues associated with the memristive neural network hardware implementations.