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Nota di contenuto	Abstract -- Figure list -- Table list -- Chapter 1. Introduction -- Chapter 2. Literature Survey -- 2-1. Lead-free Piezoelectric Ceramics -- 2-2. Memristor-based Neuromorphic System -- 2-3. Memristor as Artificial Synapses -- 2-4. Piezoelectric Nanogenerators -- Chapter 3. Experimental Procedure -- 3-1. Preparation of KN Sputtering Target -- 3-2. Experiments of KN Thin Films -- 3-3. KNbO <sub>3</sub> ReRAM Devices -- 3-4. KNbO <sub>3</sub> Piezoelectric Nanogenerators -- 3-5. Biocompatibility Assessment of KN film -- Chapter 4. Results and Discussion -- 4-1. Growth Behavior of KN Thin Films -- 4-2. KNbO <sub>3</sub> -Based ReRAM Devices -- 4-3. KNbO <sub>3</sub> -Based Piezoelectric Nanogenerators -- 4-4. Self powered KNbO <sub>3</sub> ReRAM device -- 4-5. KNbO <sub>3</sub> -based Memristor -- 4-6. Biocompatibility Assessment of KNbO <sub>3</sub> Thin films -- Chapter 5. Conclusions -- References.
Sommario/riassunto	This thesis describes an investigation into homogeneous KN crystalline films grown on Pt/Ti/SiO <sub>2</sub> /Si substrates, amorphous KN films grown on TiN/Si substrates using the RF-sputtering method, and the ferroelectric and piezoelectric properties of these KN films. KNbO <sub>3</sub> (KN) thin films

have been extensively investigated for applications in nonlinear optical, electro-optical and piezoelectric devices. However, the electrical properties of KN films have not yet been reported, because it is difficult to grow stoichiometric KN thin films due to K<sub>2</sub>O evaporation during growth. This thesis also reports on the ReRAM properties of a biocompatible KN ReRAM memristor powered by the KN nanogenerator, and finally shows the biological synaptic properties of the KN memristor for application to the artificial synapse of a neuromorphic computing system.

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