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Effect of thermal annealing on structure and conductivity of hafnium oxide thin films

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Hafnium oxide HfOx is one of the promising materials in modern electrical physics. Due to its high dielectric constant, chemical and physical stability, its thin films are often used in the manufacture of capacitors, transistors and other microelectronic devices, such as gas detectors. In addition, hafnium oxide has a resistive switching effect. This effect is the basis for creating unique elements of an electric circuit - memristors, capable of having several resistive states and changing them depending on the electric current. Due to the mechanism of their operation, memristors are used to create fast, compact, non-volatile memory cells. But increasing the service life of memristors, as well as their stability, remains an open problem.
Changing the structural properties due to annealing at high temperatures can significantly improve the conductivity of the films, as well as increase the stability of their operation.
In our research, we studied the effect of annealing in air atmosphere at temperatures of 400, 500 and 600 oC on the structural and electrical properties of films obtained by electron beam deposition. This information can be used to create electrical devices based on hafnium oxide and to improve the key properties of memristors based on them.

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Primary author: KUCHUMOV, Ivan (Lomonosov Moscow State University, Faculty of Physics,Department of General Physics and Molecular Electronics)

Co-authors: Mr MARTYSHOV, Mikhail (Lomonosov Moscow State University, Faculty of Physics); Prof. PHORSH, Pavel (Lomonosov Moscow State University, P.N. Lebedev Physical Institute of the Russian Academy of Sciences)

Presenter: KUCHUMOV, Ivan (Lomonosov Moscow State University, Faculty of Physics,Department of General Physics and Molecular Electronics)

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