Microscopy techniques-based optimization of growth technology of CuO films for RRAM applications

Monika Ozga [1], **Robert Mroczynski** [2], **Anna Wolska** [1], **Marcin Klepka** [1], **Marek Godlewski** [1] **and Bartlomiej S. Witkowski** [1]

[1] *Institute of Physics of the Polish Academy of Sciences, Al. Lotnikow 32/46, 02-668 Warsaw, Poland*
[2] *Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Koszykowa 75, 00-662 Warsaw, Poland*

CuO films are obtained using innovative hydrothermal technology. The growth takes place under atmospheric pressure, at low temperatures (below 100℃), and the duration of a single growth process is from several dozen seconds to 6 minutes [1]. The resistive switching phenomenon was observed in the CuO films, suggesting their potential for use in resistive random access memories (RRAM) [2].
To enhance the memory characteristics of CuO films, the technology was modified by introducing a cyclic repetition of the hydrothermal growth process (HT) combined with rapid thermal annealing (RTA). The objective of this modification was to achieve continuous CuO layers with lower impurity content and improved electrical stability. The optimization process relied primarily on microscopic techniques, including scanning electron microscopy (SEM) and scanning probe microscopy (AFM, SCM, KPFM), along with EDX and XPS analyses [3]. Comparative results of tests of memory structures with as grown CuO films and those subjected to the "HT+RTA" procedure will also be presented.

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