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Optimizing of thin film superconducting lead photocathodes at NCBJ in Świerk

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Keywords: photocathode, thin film, lead

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Photocathodes deposited as thin lead films on a wall of a niobium RF cavity were accepted as a way to construct superconducting RF e^- injectors [1-2]. Ultra High Vacuum cathodic arc was implemented and developed at NCBJ to deposit thin Pb films which can be used as superconducting photocathodes in electron guns of superconducting radio-frequency linear accelerators [3]. The main drawback of this method is the presence of lead droplets within the films. In electromagnetic field the micrometer-sized droplets cause such effects as dark current or field emission. To cope with this problem filtering of metal plasma flux is applied inside deposition devices that typically reduces the film deposition rate by orders of magnitude which in turn leads to thinner layers with degraded purity.

Therefore, to reach sufficiently smooth and thick lead photocathodes we decided to deposit lead using unfiltered plasma deposition and next recrystallize the obtained films. We report on our current works aimed at establishing such post-deposition heat treatment.

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Temperature evolution of structural properties of hexagonal NiAs-type MnTe

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Keywords: MnTe, lattice parameters, thermal expansion

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NiAs-type MnTe exhibiting antiferromagnetic properties is particularly interesting due to the possibility of its applications in spin electronic devices. The successful growth of such MnTe thin layers by MBE [1] opened a possibility of its potential applications in multilayer structures. The expansion coefficients of materials constituting given structure belong to important parameters required for correct interpretation of the physical properties of considered multilayer. Previous MnTe literature data were limited to narrow temperature range (170 - 350 K) [2, 3] and demonstrated a sharp decrease of the *c* parameter value with decreasing temperature below Néel temperature (T_N) unaccompanied by any significant change in the *a* parameter temperature dependence.

The high quality single MnTe crystals were grown in the Institute of Physics PAS and investigated by the XRD methods using synchrotron radiation in Hasylab at the temperature range from 15 K to 1100 K. The linear expansion coefficients for *a* and *c* parameters were determined. A partial transformation of MnTe into $MnTe_2$ at high temperatures was observed. At T_N value the *a* parameter exhibit a kink in its temperature dependence.

Acknowledgements: This work was partially supported by Polish research grant N N202 128639 and by the European Union within the Neutron Muon Integrated Infrastructure Initiative under contract NMI3-II EC-GA 283883.

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