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PbTe and PbS single-crystalline films growing on silicon substrates with fluoride buffer layers

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Single-crystalline PbTe and PbS films with *p-n* junctions have been grown on silicon substrates coated by intermediate CaF_2 and BaF_2 layers.

Монокристаллические пленки PbTe и PbS с *p-n* переходами выращены на кремниевых подложках, покрытых промежуточными слоями CaF_2 BaF_2.

Semiconductor $A^{IV}B^{VI}$ compounds are of great interest for applications in infrared techniques [1]. Study of growing and electrical properties of PbS and PbTe thin films on silicon substrates are presented in this work.

Samples were prepared by vacuum condensation of PbS and PbTe on substrates using the "hot wall" technique [2]. To provide a proper structure perfectness of layers, the intermediate buffer layers of CaF_2 and BaF_2 were preliminary grown on the silicon substrate. Growth conditions are shown in the Table below.

X-ray diffraction examinations show the single crystalline structure of obtained films with [111] orientation. Formation of *p-n* junction was provided by doping from an additional dopant source during growth. PbS films were doped with Se and PbTe ones, with In. Electrical properties of thin films and *p-n* junctions were estimated by measuring Hall coefficient and *I-V* characteristics. It was shown that good-quality single-crystalline films of PbTe and PbTe with *p-n* junctions can be grown on silicon substrates with BaF_2 and CaF_2 buffer layers.

References

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2. H.Holloway, *Physics of Thin Films*, **11**, 105 (1980).

Buffer layer material	Source temperature, °C	Substrate temperature, °C	Growth rate, nm/s	Growth time, h	Layer thickness, μm
BaF_2	650–700	500–550	0.1–0.2	2–3	0.2–0.3
CaF_2	700–800	300–600	0.1–0.3	1–3	0.1
PbTe	570–430	350–430	0.4–0.8	3	2–10
PbS	720–770	340	0.4– 2.5	3	2–10