

Industrial production of GaAs and $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ based crystals and epitaxial structures in Ukraine: actuality and development outlook

V.V.Bogoyashchiy, K.R.Kurbanov, A.P.Oksanich

Institute for Economics and New Technologies, 24/37 Proletarskaya St.,
36900 Kremenchuk, Ukraine

Received May 12, 2000

The production development prospects of semiconductors for electronic engineering, namely, of GaAs and $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$, in Ukraine are discussed. The Ukrainian enterprises have been shown to be experienced sufficiently in the production of high-quality bulk single crystals as well as epitaxial structures of those materials. The available scientific and technical potential allows to count on the successful manufacturing development of the materials mentioned and on the production of quite competitive articles. Some characteristics of GaAs and $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ crystals obtained in large-scale production have been presented.

Рассмотрены перспективы развития производства полупроводниковых материалов электронной техники — GaAs и $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ — в Украине. Показано, что предприятия Украины обладают достаточным опытом производства высококачественных объемных монокристаллов этих материалов и эпитаксиальных структур на их основе. Имеющийся научный и промышленный потенциал позволяет рассчитывать на успешное развитие производства материалов этого типа и получение вполне конкурентоспособной продукции. Представлен ряд характеристик кристаллов GaAs и $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$, получаемых в серийном производстве.

1. Introduction

The modern scientific progress is impossible without a comprehensive advance in electronics, including the semiconductor one basing on such materials as silicon, germanium, A_3B_5 and A_2B_6 type compounds and solid solutions. Ukrainian enterprises, in particular, Svetlovodsk Pure Metal Works (PMW, today Pure Metals Co., Ltd.) were produced most of those materials in the industrial scale; in the late 80^s, the production volume and quality were close to European standards in many parameters. In particular, the PMW provided 80 to 100 % of the USSR needs for such materials as GaAs and $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$.

The economic depression of 90^s hindered considerably the development of semiconductor technologies and semiconductor materials science in Ukraine. Those materials,

nevertheless, define to a great extent the engineering and technologic level in the country. It is obvious, therefore, that their production must be resumed already in the nearest future. In this connection, the crystal quality and production range must be raised to the modern level. To that end, the production equipment should be renewed radically.

In this paper, problems are discussed connected with the industrial production development prospects and directions in Ukraine in the field of basic semiconductor materials, such as GaAs and $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$.

2. Mercury-cadmium-tellurium (MCT) solid solutions

Crystalline narrow-band $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ solid solutions are used mainly to develop high-sensitivity IR emission sensors in the wave-