Gallium arsenide

the binary connection **gallium arsenide** (ATMs) is a semiconductor material, which can be both semiconducting (endowed with elements from the groups of II, IV or VI of the periodic system) and semiisolierend (unendowed). The connections and epitaxy developing on this substrate material - layers are the output product for productionelectronic elements for applications of high frequencies and for the transformation of electrical into optical signals.

simplified tape structure of ATMs with 300 K

gallium arsenide crystallized cubically in zinc blende - structure, i.e., it consists of two cubic-face-centered lattices into one another-placed, ever with gallium - (group of III) and/or. Arsenic - atoms (group of V) occupies, which are against each other shifted a quarter of the body diagonals of the cubic unit cell. The grating space amounts to at ambient temperature 5.6533 Ångström. The atomic density is 4.43 x 10 ² ² Atome/cm ³. The energy gap amounts to 1,424 eV. The specific weight is 5.315 g/cm ³. ThatMelting point is with 1238°C. In the basic research and the semiconductor industry ATMs particularly in the context of the material system aluminum gallium arsenide is used for the production of semiconductor heterostructures.

Construction units from gallium arsenide switch ten times faster than their comparable counterparts from silicon, are besides less trouble-prone with similar signals andhave a smaller power requirement. Therefore gallium arsenide is considered as important raw material to telecommunications. In efficient mobile telephones the elements (integrated circuits) for the receipt and sending signals are based on gallium arsenide. Beyond that gallium arsenide is used, over by lasers and/or.surface-emitting lasers (VCSEL) information by glass fiber TZE to send as well as satellites with energy from high-specialized solar cells (Photovoltaik) to supply. Even in the everyday life gallium arsenide is used, as for instance when playing CD, where a laser from gallium arsenide help to the music benefit. A furtherimportant product are light emitting diodes.

Gallium arsenide could not nevertheless displace the silicon as mass semiconductors for rather everyday applications. The reasons for it are the smaller price of silicon, its larger single crystals, whereby more chip in a passage it can be produced and the possibility, in siliconto produce more easily isolating ranges, than it is possible in the gallium arsenide. In addition the complete innocuousness of silicon, contrary to the very poisonous arsenic comes. A further advantage for the use of silicon is its environmental compatibility; Gallium arsenide in electronic construction units creates particularly with the disposaladditionally environmentalpolitical problems, which must be mastered separately.

The production of gallium arsenide single crystals takes place via synthesis of the two elements gallium and arsenic and that to it following crystal growth after the LEC (liquid Encapsulated Czochralski) or VGF

(vertical gradient Freeze) procedure. On the wafer produced from it can in the epitaxy - plant ATMs or AlGaAs in perfect, single-crystal quality to be grown up. Usually this happens with a rate of approx. 1 µm/h dependent on the growth method.

Table of contents

manufacturers

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- Hitachi Cable http://www.hitachi-cable.com
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solid-state physics, semiconductor physics

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