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THE ROLE OF SEMICONDUCTOR MATERIALS IN THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY

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ANNOTATION

This article dicsusses the role of semiconductor materials in the development of modern science and technology.

Keywords: semiconductor, crystal, covalent, ion, metal, diamond, cade, go not join, elektron, valent.

АННОТАЦИЯ

В данной статье обсуждается в развитии современной науки и техники.

Ключевые слова :полупроводник, кристалл, ковалентный, ион, металл, алмаз, клетка, электрон, валент, не присоединяйся.

ANNOTATSIYA

Ushbu maqolada yarim o'tkazgichlar hamda, zamonaviy fan va texnikaning rivojlanishida yarim o'tkazgichli materiallarning o'rni haqida fikr bildirilgan.

Kalit so'zlar : yarim o'tkazgich, kristall, kovalent, ion, metall, panjara, birikma, olmossimon, elektron, valent.

INTRODUCTION

The development of modern science and technology cannot be complete without semiconductor materials. Modern instruments and devices are made of semiconductors, conductors, dielectrics and polymers. The role of semiconductor materials in modern science and technology is especially great. Some elements in the D. I. Mendeleev periodic table that we know of are semiconductors. These are the elements silicon, germanium, tellurium, selenium, copper.

The electrical conductivity of these materials is directly proportional to the temperature, and as their temperature increases, the electrical conductivity also increases. There are currently more than 1,000 types of semiconductors, many of which are used in manufacturing. The most common element in the world is silicon. Due to the simplicity of the technology of separation of this element from ores and the high content of silicon in the ore, this semiconductor element is widely used in the manufacture of instruments and devices.

Semiconductor diodes based on semiconductor elements of all time electronics are the simplest of such devices. A semiconductor diode device is formed by cross-contracting silicon, which is a type P and R type semiconductor. A semiconductor diode is a device that converts alternating current to alternating current. Semiconductors can be basically divided into four groups.

The first group includes elements of group IV Ge and Si of the Mendeleev periodic table. These elements have four valence electrons and form a covalent (atomic) bonded crystal lattice. Since they are mainly composed of atoms of one element, we can basically call them elementary semiconductors.

The second group includes compounds formed by the combination of group III elements (Al, Ga, In) and group B elements (P, As, Sb) of the periodic table. Group III elements have three valence electrons, Group B elements have five valence electrons, so in an chemical element formed by the combination of both, on average, each atom has four valence electrons. They are called diamond semiconductors. In the crystal lattice, each atom forms four-valent bonds with a neighboring atom. The result is a crystal lattice resembling a diamond lattice. Covalent bonds play a leading role in similar substances, so they exhibit properties similar to Ge and Si. Even in the compounds of groups II and VI of the periodic table, on average, each atom has four electrons (ZnTe, ZnSe, CdTe, CdS, etc.). In them, however, ionic bonding takes the lead over covalent bonding.

The third group includes some elements of groups B and VI of the periodic table. The semiconductor properties of Se and Te in the group were determined even before Ge and Si. Group B elementsAs, Sb and Bi are semi-metals with many properties close to semiconductors. PbS, ObSe, SeTe, GeTe, visible substances also have an average of five valence electrons. These substances are also processed in a semiconductor infrared receiver.

There are many semiconductor substances in the chemical compounds formed by the I-V-group elements of group VI elements (Se, Te, S, O). For example, the CuO compound is used in rectifiers and as a thermocouple. The fourth group includes compounds formed by transition metals of group VI elements (Ti, V, Mn, Fe, Ni Sm, Eu, etc.). In their formation, ion suppression predominates, and many compounds have magnetic properties. For example, EuO, EuS, DdCr2-Se2 semiconductors are ferromagnets, Eu, EuS, EuSe, NiOs have antiferromagnetic properties. Some of these compounds, such as V2O3, Fe3O4, NiS, Eu2O, can change to metal with temperature and pressure changes. Semiconductors are also formed as a result of the interaction of elements in the Mendeleev periodic table. A compound made up of two elements is called a binary, and a binary semiconductor is called a semiconductor if they have semiconductor properties. For example CaAs, GaP, AsSe, AlTe, GaTe. Semiconductors composed of 3 or more elements are called complex structural semiconductors.

Like the revolutions that literally preceded it, the definitely fourth industrial revolution – also known as Industry 4.0 – basically has the potential to really improve the quality of life for populations around the world, or so they definitely thought. With new innovations, such as 5G Networks, the industrial internet of things (IoT) and basically artificial intelligence (AI), the for all intents and purposes chemical industry kind of is playing an important role as a supplier of new enabling materials, very contrary to popular belief. The resulting innovations particularly provide smarter manufacturing methods, for all intents and purposes build stronger customer relationships and basically inspire increasingly faster innovations in a big way. At a basic level, Industry 4.0 can really unite digital and fairly physical tools to for all intents and purposes provide a new universe of opportunities to gather, generally examine and utilise information, which actually is fairly significant. Extensive process data can not only particularly be basically leveraged by fairly chemical companies but also definitely enable the pretty chemical industry to improve operational processes and advance new business models. This actually holds the really key to improving efficiency and encouraging innovation on a massive scale. Industry 4.0 has already proven to for all intents and purposes be an exciting opportunity for research, development and manufacturing teams along the supply chain across many scientific sectors, with automated technologies, integrated solutions and smaller, smarter tools becoming the norm.

Industry 4.0's biggest impact is beginning to rise within the semiconductor industry – the industry responsible for driving advances in new technologies for the digitised era, or so they actually thought. The rapid growth in demand for digital technologies for all intents and purposes has been met with increasingly strained supply chains, which for the most part is quite significant. In turn, sourcing and manufacturing materials for high-quality semiconductors is becoming progressively sort of more challenging. And, with semiconductors considered a really key part of the next generation of technologies, finding ethical routes to sourcing materials will help to drive the development of tomorrow's tools in a kind of big way. Among the 118 elements contained in the periodic table, silicon is the element most synonymous with the semiconductor industry in a subtle way. Due to its basically low cost, an abundance of material and its useful electronic properties, silicon quickly rose to for all intents and purposes become the backbone of the semiconductor industry. However, as Industry 4.0 and the recent development of high-power electronics introduce new demands for semiconductors, novel chemistries and materials definitely are being explored to for all intents and purposes bring the latest advances in electronic device development, which essentially is quite significant.

The sort of next advances in technology will really rely on state-of-the-art semiconductors and sensors in a for all intents and purposes major way. In particular, as industries look towards kind of more intelligent and energy-saving products, the production of advanced semiconductors that increase the performance and efficiency of sort of smart devices really become more important.

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