

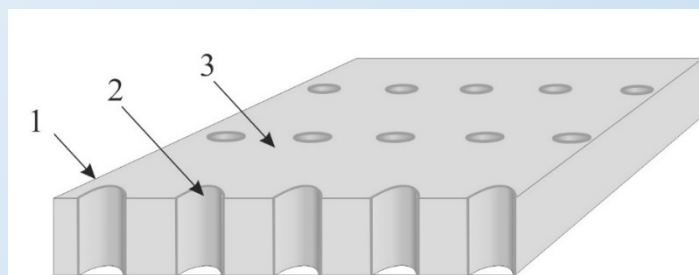
Technology market “RESEARCH TO BUSINESS”

Offer № 013PA

Anisotropic plate Valentin Videkov, Boriana Tzaneva

A material in the form of a plate with anisotropic parameters, serving as a connector between optoelectronic elements, has been developed at Technical University of Sofia. Depending on the construction, it provides an anisotropic electrical and anisotropic optical connection, for which a patent has been issued in Bulgaria.

Application № 113112



- 1 – anisotropic plate;
- 2 – metalized through holes in optically transparent material;
- 3 – dielectric substrate.

Materials for anisotropic contacting/bonding of surface mount elements and other applications are known. They represent a thin dielectric base in which conducting spherical particles are located with a concentration such that they do not contact each other. When pressing the terminals of the element to the contact pads, they contact vertically through the conducting spheres without lateral connection. A disadvantage of the known anisotropic adhesives for anisotropic contacting is that they are composed of particles mixed in an epoxy or similar composition, which does not provide a high level of anisotropy repeatability. The lack of inverted anisotropy, electrical or optical anisotropy is also a disadvantage.

Technical solution

An anisotropic contacting element in the form of a plate, ribbon or layer is prepared. This element provides uniform anisotropy along the entire area in the near and far order, the anisotropy being invertible with respect to electrical and optical conductivity. The anisotropic plate for mounting optoelectronic elements is an elastic dielectric base of optically transparent material with holes that are filled with metal. According to the degree of filling of the holes with metal, there can be two alternative topological implementations (see diagrams below). When the entire surface of the plate is covered with metal, there is electrical conductivity in the horizontal and vertical directions, and optical conductivity only in the vertical direction. In the case when only the pores are filled with metal, there is electrical conductivity only in the vertical direction, and optical conductivity in both directions. The type of metal or combination of metals is not limited and depends on the specific application.

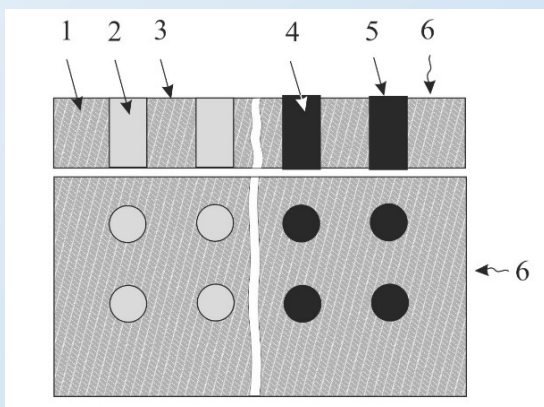
Depending on the ratio of the sizes of the diameters of the holes, their distance and arrangement, the optical properties can be changed.

Application and advantages

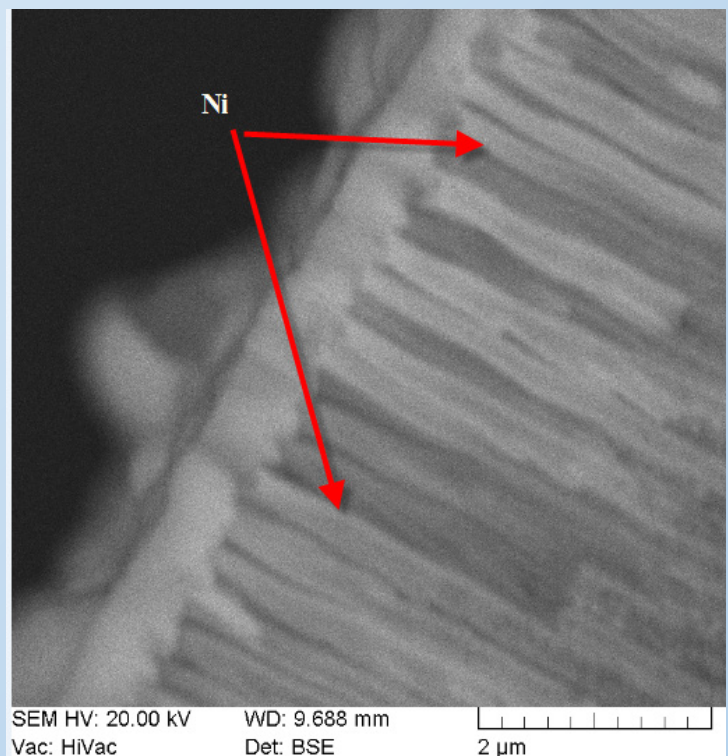
An exemple implementation of an anisotropic plate is shown in the electron microscope photograph below, which represents a fragment of an anisotropic layer. Nanoporous anodic aluminum oxide was used as dielectric material. Hole diameters can be controlled from 25 to 200 nm depending on anodizing conditions, including electrolyte and voltage. Depending on the duration of the process, a dielectric layer of different thickness is obtained, for example the thickness obtained in 4 hours is about 30 μm . Electroless plating is used for nickel deposition from a solution of nickel ions and the reducing agent sodium hypophosphite solution. The above implementations are exemple and do not limit the use of various dielectric base materials, metals used and methods for their deposition. Deposition of the metal layer can also be done by chemical vapor deposition or layer by layer atomic deposition.

The advantage of the anisotropic plate is that the anisotropy parameters are the same along the entire area in a small or larger section. An advantage is also the possibility to invert the anisotropy for electrical or optical conductivity depending on the design solution.

Technological images



- 1 – anisotropic plate;
- 2 – through holes in optically transparent material;
- 3 – dielectric substrate;
- 4 – metal in the holes;
- 5 – contact surface.



Contact for this offer



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