

Optimization of preparation conditions of A_2B_6 semiconductor films by electropray pyrolysis

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The set of factors influencing the cadmium sulfide film preparation process using electropray pyrolysis has been considered. The effect of various physical forces on a charged droplet moving towards a substrate has been evaluated. Comparative analysis of current transfer characteristics at electrodispersion of some liquids (alcohol, water, glycerin) and salt solutions based thereon has been done. Data on the spraying ability of these objects has been obtained. The study results made it possible to develop recommendations on optimization of the film preparation conditions.

Рассмотрен комплекс факторов, влияющих на процесс получения пленок сульфида кадмия методом электропульверизационного пиролиза. Оценена величина воздействия различных физических сил на заряженную каплю при движении ее к подложке. Проведен сравнительный анализ особенностей токопереноса при электродиспергировании некоторых жидкостей (спирт, вода, глицерин) и растворов солей на их основе, получена информация о степени их распыляемости. Результаты исследований позволили выработать рекомендации по оптимизации условий получения пленок.

Development of modern methods for semiconductor film preparation becomes more and more important in connection with ever increasing field of their application. For solution of various technical problems, of great importance is accumulation of knowledge on mechanisms of physico-chemical processes of layer deposition, their structure and property formation. The variety of the film properties is due to numerous factors, the technological one being decisive. Today, numerous physical and chemical methods have been elaborated and are in use. The film preparation using pneumatic solution deposition onto a substrate is among the mentioned chemical techniques. The method is attractive due to the relative simplicity of equipment and technology but has a series of substantial drawbacks. Those include, in particular, large consumption of liquids, polydispersity of aerosols, and instability of the spraying process. These drawbacks may result in formation of films with structure defects. The problems exist-

ing have stimulated search for more perfect techniques of semiconductor layer growing and their structure control.

In this connection, we have developed a novel method for the film preparation, the electropray pyrolysis (ESP). A characteristic feature of the method consists in that the solution is dispersed using an electrical field. This makes it possible to avoid drawbacks inherent in the pneumatic spraying. The essence of the technique consists in that a charged liquid aerosol containing the film initial components in an appropriate concentration is applied onto a heated substrate [1]. The use of charged aerosol increases the deposition efficiency, prevents the fusion of droplets in the flow, and stabilizes its parameters. The semiconductor layer is formed on the substrate as a result of a pyrolytic reaction between the solution components. For example, when cadmium sulfide film is to be prepared, cadmium chloride and thiourea can be used as the initial components.