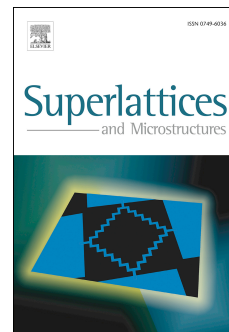


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A novel method for synthesis of arsenic sulfide films employing conversion of arsenic monosulfide in a plasma discharge

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Abstract

A novel plasma-based method for synthesis of arsenic sulfide films with different structural units and stoichiometries is demonstrated. For the first time As-S films have been prepared via direct conversion of arsenic monosulfide (As_4S_4) as a single precursor in a low-temperature non-equilibrium RF plasma discharge at low pressure. The interplay between composition, structure and properties of the chalcogenide materials prepared has been studied. Quantum-chemical calculations have been performed to gain insight into the films structure and the mechanism of its formation in the plasma discharge. Raman spectroscopy proves that with the As-content increase in the As-S films the intensity of the line, corresponding to vibrations of homopolar As-As bonds in the realgar As_4S_4 units and in the $\text{S}_2\text{As-AsS}_2$ bridges increases. The last ones are responsible for the appearance of a photoluminescence phenomenon in chalcogenide glasses.

Keywords: chalcogenide films, PECVD, arsenic monosulfide, photoluminescence

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1. INTRODUCTION

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