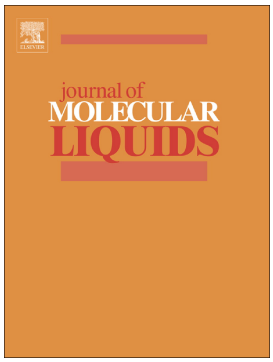

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PII: S0167-7322(17)35061-4
DOI: https://doi.org/10.1016/j.molliq.2017.12.097
Reference: MOLLIQ 8393

To appear in: *Journal of Molecular Liquids*

Received date: 23 October 2017
Revised date: 12 December 2017
Accepted date: 19 December 2017

Please cite this article as: D. Zhulai, A. Koval'chuk, S. Bugaychuk, G. Klimusheva, T. Mirnaya, S. Vitusevich , Photoconductivity of ionic thermotropic liquid crystal with semiconductor nanoparticles. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), https://doi.org/10.1016/j.molliq.2017.12.097

Photoconductivity of ionic thermotropic liquid crystal with semiconductor nanoparticles

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Abstract

The characteristics of photocurrent are investigated in new nanocomposites of cadmium octanoate with semiconductor nanoparticles (NPs) as well as in pure matrix of the cadmium octanoate. CdS NPs are synthesized inside the cadmium octanoate matrix during one-step chemical reaction. The photoconductivity in these nanocomposites has been detected in wide temperature range. The photocurrent exhibits nonlinear behavior over all different mesophases of the nanocomposites. Two types of near-electrode processes that occur depending on the value of applied voltage are considered to explain the nonlinear dependence of the current-voltage characteristics.

Keywords: ionic liquid crystals; nanocomposite; photoconductivity; nanoparticles; CdS quantum dots

Introduction

Liquid crystal materials are currently well known owing to their widely using for the production of displays. At the present time more than 80% of industrial displays are based on the liquid crystals (LC). The ability to control the parameters of LC under the action of a relatively small voltage makes them promising materials for use in display and others technologies. One of the perspective direction for the use of LC can be development of controllable photosensitive elements. Therefore, the study of photoconductivity in LC besides of a scientific interest can have also of great practical importance.

As it follows from the analysis of published data, the photoconductivity has been studied in detail in discotic LC [1-5] and nematic LC [6,7]. Also the photoconductivity has been investigated in liquid crystals of zinc porphyrin [8], liquid - crystalline derivatives of 6-oxoverdazyl [9], E7 doped C_{60} [10], π-conjugated oligothiophene-based polycatenar liquid crystals [11] and in LC polymer Carbazole-containing systems [12]. A relatively small number of publications devoted to the LC photoconductivity is related to the fact that the liquid crystals, which are used in display technologies, do not usually absorb the