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Journal of Non-Crystalline Solids

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## Landau-Placzek ratio of an inorganic glass with PbS quantum dots (Article)

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## 抄録 (Abstract)

[参考文献を表示 \(48\)](#)

The first example of application of the Rayleigh and Mandel'shtam-Brillouin scattering (RMBS) spectroscopy to a study of glass containing quantum dots (QDs) is presented. PbS QDs were precipitated in [Formula presented] glass doped with lead sulfide during successive heat treatment in several steps. After each step of the heat treatment, RMBS and absorbance spectra were measured. As a result, the Landau-Placzek ratio and QDs radii were evaluated as functions of heat treatment time. It was found that the Landau-Placzek ratio rises in the course of heat treatment by an order of magnitude. We connect this rise with an increase in Rayleigh scattering caused by increase of radii and number density of QDs. To confirm this assumption, the theoretical expression for the contribution of light scattering by QDs to the Landau-Placzek ratio was derived. The theoretical dependence of the QDs Landau-Placzek ratio on radius and number density of QDs is confirmed by the experiment. For calculation of this Landau-Placzek ratio, optical constants for PbS taken from different literature sources were used. Only the use of data from [S. Adachi](#) (1999) *Optical Constants of Crystalline and Amorphous Semiconductors* gives a good agreement between the calculated and measured values. © 2016 Elsevier B.V.

## 著者キーワード

Glass; Landau-Placzek ratio; Light scattering; Optical constants; PbS quantum dots

## 索引キーワード

**Engineering controlled terms:** Amorphous semiconductors; Brillouin scattering; Fiber optic sensors; Glass; Heat treatment; Light scattering; Nanocrystals; Narrow band gap semiconductors; Optical constants; Semiconducting lead compounds

Absorbance spectrum; Heat treatment time; Inorganic glass; Landau-Placzek ratios; Measured values; Number density; PbS quantum dots; Theoretical expression

**Engineering main heading:** Semiconductor quantum dots

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## 参考文献 (48)

[検索結果の形式で表示](#) すべて  エクスポート |  印刷 |  E-mail |  参考文献形式で出力 Efros, A.L., Efros, A.L.1 [INTERBAND ABSORPTION OF LIGHT IN A SEMICONDUCTOR SPHERE.](#)(1982) *Soviet physics. Semiconductors*, 16 (7), pp. 772-775. [被引用数 1220 回](#). Brus, L.E.2 [Electron-electron and electron-hole interactions in small semiconductor crystallites: The size dependence of the lowest excited electronic state](#)(1984) *The Journal of Chemical Physics*, 80 (9), pp. 4403-4409. [被引用数 3150 回](#).[フルテキスト](#) Ekimov, A.I., Onushchenko, A.A.

3 Quantum size effect in three-dimensional microscopic semiconductor crystals

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## 関連文献

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以下が共通している関連文献を検索:

 著者名 キーワード