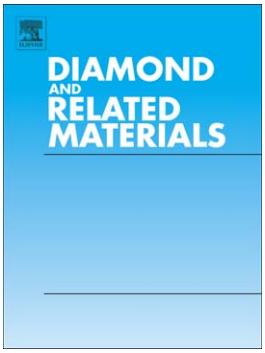

Static, ¡!–[INS][D]–¿d¡!–[/INS]–¿ynamic and ¡!–[INS][E]–¿e¡!–[/INS]–¿lectric ¡!–[INS][L]–¿l¡!–[/INS]–¿ight ¡!–[INS][S]–¿s¡!–[/INS]–¿cattering by ¡!–[INS][A]–¿a¡!–[/INS]–¿queous ¡!–[INS][C]–¿c¡!–[/INS]–¿olloids of ¡!–[INS][D]–¿d¡!–[/INS]–¿iamond

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Static, Dynamic and Electric Light Scattering by Aqueous Colloids of Diamond

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Abstract

The study of light scattering of aqueous colloids of diamond with particle size 10 — 400 *nm* was conducted. Particle concentration in colloids was low, and light scattering could be considered single. Methods of static, dynamic, and electric light scattering were employed. During the static light scattering experiments we took into account particle distribution on size that was determined from electron microscope measurements. It was shown that the experimentally obtained indicatrix of light scattering of polydisperse non-spherical diamond particle solution is in good agreement with the theoretical one for spherical particles. Autocorrelation function of depolarized light scattering intensity coincides with the time dependence of relaxation of scattered light intensity alteration after the electric field which induced particle orientation is switched off. This allows to use dynamic light scattering technique during the study of electro-optical properties of polydisperse colloids of diamond.

1. Introduction

Small particles of diamond are widely used in a variety of applications and considered to be used in medicine and biotechnology [1, 2, 3, 4]. They are typically produced as powder with particle size from 2-3 *nm* to about 1 μm [5, 6, 7], which is then dispersed in liquid to form colloids and suspensions with properties (such as light scattering characteristics and stability) which significantly depend on particle size, surface characteristics, and ionic strength of the media [8, 9, 10]. Particle aggregation in such systems depends on a variety of factors and significantly influences the characteristics of the solution. Since particle aggregation can happen rapidly as the properties of the media change, fast and robust methods which allow to determine characteristics of diamond particles are required.

As the refractive index of diamond is relatively high ($n = 2.42$), light scattering can be easily observed even for highly diluted aqueous colloids of diamond. Light scattered by these colloids can have different color and hue for different particle concentration. This makes light scattering techniques very convenient when it comes to the study of individual particles in the colloid as