NEW OPTOACOUSTIC DEVICE FOR MONITORING OF WATER PROPERTIES: Comprehensive Analyzer of Matter Properties (CAMP)

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The new quantum Hierarchic theory of condensed matter and theory based computer program (copyright 1997, USA, Kaivarainen) allow calculating about 300 physical parameters of any material, including water and ice. Among these parameters are: total internal energy, heat capacity, thermal conductivity, surface tension, vapor pressure, viscosity, self-diffusion, etc. Most of intermediate parameters of calculations are hidden for direct experimental measurements. The computerized evaluation of all of 300 output parameters is possible in a couple of seconds, if the following input experimental parameters are available:

1. Sound velocity; 2. Density; 3. Refraction index; 4. Positions of translational or librational bands in far and middle IR range: 30-2500) 1/cm.

These data should be obtained at the same temperature and pressure from the sample (liquid or solid). The Hierarchic theory and program have been verified, using the listed above input parameters for water and ice from literature in temperature range: 20 – 373 K (http://arxiv.org/abs/physics/0102086). The coincidence between theory and experiment is very good. Such possibilities led this author to idea of new optoacoustic device: Comprehensive Analyzer of Matter Properties (CAMP), providing a huge amount of information of any condensed matter under study. The FT-IR or FT-Raman spectrometer can be used for registration of spectra in far and middle IR region. The table-top system for measurement of sound velocity, density and refraction index of the same liquid, almost at the same time, is available (DSA 5000 + RXA 156; Anton-Paar, Graz, Austria). We investigated the perturbation of water properties after permanent magnetic field treatment, using this experimental approach and CAMP computer program (Kaivarainen, 2004: http://arxiv.org/abs/physics/0207114). One of possible configuration of CAMP may include the FT-Brillouin light scattering spectrometer, based on Fabry-Perrot interferometer. This configuration makes possible simultaneous measurement of hypersound velocity (from the Doppler shift of side bands of Brillouin spectra) and positions of intermolecular bands [translational and librational] from the Stokes/antiStokes satellite components on the central peak of Brillouin spectra. CAMP may allow monitoring of perturbation of very different physical properties of water, ice and other condensed matter (material) under the influence of guest molecules, temperature, pressure or external electromagnetic or acoustic fields. Our CAMP could be the ideal instrument for monitoring of water quality, using 'fingerprints' containing more than 300 physical parameters. This could be used in the environmental research and water purification enterprises.

The DEMO version of pCAMP computer program for evaluation of water and ice properties in the range: 20-373K can be downloaded from the front page of my site: www.karelia.ru/~alexk [download pCAMP].]. For additional material see:

http://arxiv.org/find/physics/1/au:+Kaivarainen_A/0/1/0/all/0/1