**Stimulated scattering**

**in Brome mosaic virus suspension**

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### Abstract

Stimulated low frequency Raman scattering (SLFRS) in the suspension of brome mosaic virus (BMV) in phosphate buffer with very high conversion efficiency was experimentally registered. BMV is a small (27-30 nm), positive-stranded, icosahedral RNA plant virus belonging to the genus Bromovirus, family Bromoviridae. We studied its form and size with the help of transmission electron microscopy and dynamic light scattering. Ruby laser pulses (λ= 694.3 nm, τ= 20 ns, Emax= 0.3 J, Δν= 0.015 cm-1) were used for SLFRS excitation. SLFRS spectra have been registered with Fabry-Perot interferometers with different ranges of dispersion. Peaks with spectral shifts of 0.45 cm-1 (13.5 GHz) , 0.55 cm-1 (16.5 GHz), 0.74 cm-1 (22.2 GHz), 1.08 cm-1 (32.4 GHz) and 1.94 cm-1 (58.5 GHz) were registered both for forward and backward scattered waves. Their maximum conversion efficiency was 30%, 45%, 35%, 35%, and 15% respectively. Two components of the SLFRS spectrum were identified as “breathing” and quadrupole modes of BMV vibration. Damping characteristics and gain factors for these modes are determined. It is shown that using the core-shell model for BMV taking into account the influence of the environment the acoustic properties of individual components of such a composite nanosystem could be determined. Thus, sound speed in RNA core of BMV was defined by using spectral characteristics of SLFRS.

Stimulated low frequency Raman scattering (SLFRS) can be used both to obtain spectral information about the systems under study [1] and as a source of biharmonic pumping [2]. Moreover, the difference frequency of biharmonic pumping is determined by the natural acoustic frequency of nano or submicron particles that make up the system under study. This radiation can be used for effective resonant and selective impact through ponderomotive interaction on various systems of nanoscale (or submicron) particles, including biological ones with corresponding natural acoustic frequencies [3].

**Recent Publications (**M.A.Shevchenko, L.L.Chaikov, M.N.Kirichenko, e al., JRLR **40,** 111 (2019). **)**



Biography

Shevchenko Mikhail. In 2010, graduated from the MEPhI specialty in "condensed matter Physics". In 2013, he graduated from the LPI post-graduate school in “Optics”. Currently he is a Junior researcher in the Department of Optics of LPI. His research areas are nonlinear photonics, spectroscopy, stimulated Raman scattering.

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