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The feature of resonant stimulated Raman scattering of dyes in a random media

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The work is devoted to the exploration of convenient conditions for Raman spectroscopy of laser dyes. Having strong luminescence prevents dye Raman spectroscopy from the resonant condition use while excitation wavelength is within a dye absorption band.
Otherwise the use of excitation wavelength out of the absorption band is not informative owing to matrix Raman lines appearance and being more intensive in this case. Thus to use a convenient Raman Spectroscopy for dye Raman spectra investigation the proper conditions should be chosen.
We investigated Raman spectra of lasing dyes embedded into different polymeric matrixes and dye crystal powder. The conventional Raman spectra technique was carried out under different excitation wavelengths. The results were compared with the vibration spectra obtained by SERRS method.
The Raman spectra observed by conventional technique under nom-resonance excitation revealed two sets of spectral lines against a constant background. These are matrix molecules and dye molecules Raman spectra. The dye Raman lines are essentially weaker and unlike the matrix spectrum the dye Raman lines significantly grow under the excitation closing to the dye absorption band. The excitation shift to the resonant condition causes luminescence to grow as well. Based on luminescence and Raman lines intensity relation the most appropriate conditions for dye Raman spectra conventional technique observation were proposed.
The spectra comparison with the spectra obtained by SERRS method showed that SERRS method is more informative for dye vibration spectra investigation as neither luminescence nor matrix emission are revealed in this method.

Topics

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