[Painel - 14:00]

$^{12}CD_3OH$ OPTICALLY PUMPED FAR-INFRARED LASER: A GOOD SOURCE OF HIGH FREQUENCY LINES OF INTEREST TO SPECTROSCOPY.

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$^{12}CD_3OH$ is one of the most important methanol isotopomers for the generation of high frequency laser lines in the far-infrared region (FIR) in the wavelength range 22 to 160 μm. Over 400 FIR laser lines have been discovered in this molecule in the range 22 to 3030 μm by optically pumping it with CO_2 lasers. Fourty-five percent of those have wavelengths shorter than 160 μm . In this work we will present these FIR lines along with their frequency measurements to highlight the availability of these high energy laser lines ready to be used in applications. Less than half of the laser lines in this wavelength range have been frequency measured. Therefore, an effort towards the measurement of the frequencies of the remainder lines in order to make these coherent sources available for spectroscopic applications is welcome.

[Painel - 14:00]

STUDY OF UV FLUORESCENCES INDUCED FROM $4f^3 \rightarrow 4f^25d$ MULTISTEP ABSORPTIONS OF Nd^{3+} IONS IN $YLiF_4$ AND $LuLiF_4$ CRYSTALS

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Nd^{3+} ultraviolet fluorescence induced by multiphotonic laser excitations was studied in doped $Nd:YLiF_4$ (YLF) and $LuLiF_4$ (LLF) crystals by using the time resolved spectroscopy technique. The UV luminescences are due to transitions between the $4f^25d$ and the $4f^3$ electronic configurations of Nd^{3+} ions. The $4f^25d$ configuration can be reached by direct pumping the UV transition or by multiphotonic excitation, both processes gives raise to the UV band emission with structure due to the strong phonon coupling expected for 5d orbital involvement in the transition. The multiphotonic excitation process is due to three photons (532 nm) sequential absorptions by metastable levels of the $4f^3$ configuration splitted by crystalline local field. The sequential excitation of Nd by the laser pumping is attributed to the $^4I_{9/2}$+532nm$\rightarrow ^4G_{7/2}$ ground state absorption followed by the $^4G_{7/2}$ +532nm$\rightarrow ^2F_{5/2}$ and $^2F_{5/2}$+532nm$\rightarrow 4f^25d$ excited state absorptions. The UV emissions due to $4f^25d$ configuration are parity allowed, having lifetime of 35 ns in contrast to UV emissions from $4f^3$ configuration which are induced by two absorption steps and are parity forbidden showing longer lifetime of 8μs and narrow lines. The polarization effects of the UV emissions were studied and their behavior are dependent on the excited state configuration involving or not the 5d orbital. The allowed UV emissions positions were affected by the host variation more than the ones originating from the $4f^3$ configuration as expected. The electronic energy of the $4f^25d$ configuration shifts to lower energy for increasing the crystal field. (FAPESP, CNPq)

[Painel - 14:00]

STUDY OF THE OPTICAL PROPERTIES OF HEAVY METAL AND GALLIUM OXIDES GLASSES DOPED WITH NEODYMIUM

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We present the spectroscopic results of a new family of Nd doped BPG ($Bi_2O_3 - PbO - Ga_2O_3$) glasses. These glasses are being produced at the Laboratory of Glasses and Datation at FATEC-SP. The main characteristics of BPG glasses are the transmission into the far infrared region, the high refractive index and the nonlinear optical behavior. At fixed 1mol% Nd doping level, we observed four absorptions bands at about 580, 750, 800 and 880nm. Three emission bands centered at 877, 1066 and 1341nm are measured when pumping at 797nm. The main emission line at 1066nm shows a cross-section of 1.1 x 10^{-20}cm^2 and a spectral linewidth of 30nm. The Judd-Ofelt parameters are calculated and used to evaluate transition probability, radiative lifetime and branching ratios. The refractive index (2.5) is determined by means of the apparent depth method, in which the optical thickness is related to its physical thickness. No up conversion fluorescence was observed and the sample exhibited a very good mechanical resistance under high-brightness, diode laser pumping. The results obtained for Nd:BPG glasses indicate their use as a new active laser material.