II-6 11:45 a.m.-11:55 a.m.

PHOTOLUMINESCENCE SPECTRA OF EPITAXIAL SINGLE CRYSTAL C_{60}

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We report the photoluminescence spectrum of well characterized, epitaxially grown single crystal C_{60} thin films. The highly regular and reproducible features observed can be explained by a simple molecular model which takes into account enhanced coupling of an excited C_{60} molecule with its nearest neighbor. This model provides an identification of all the observed spectral features at low temperature including a qualitative understanding of the relative peak height ratios, as well as the observed temperature dependence of the PL spectrum.

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II-7 11:57 a.m.-12:07 p.m.

DIODE LASER BASED INFRARED SOURCE FOR APPLICATION IN SPECTROSCOPY AND REMOTE SENSING

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We report a tunable difference-frequency infrared source for high resolution spectroscopy and remote sensing based on silver thiogallate and diode lasers. In the feasibility experiment, more than 2 μW of cw mid-infrared radiation near 3.2 μm was generated in $AgGaS_2$ crystal by difference-frequency mixing an extended-cavity-diode pump laser near 795 nm and a compact diode-pumped monolithic Nd:YAG signal laser at 1064 nm. An external ring enhancement cavity was used to build up the signal wave inside the nonlinear crystal by a factor of 14.5. The output idler wavelength was tuned from 3.155 to 3.423 μm (3170-2921 cm^{-1}) by crystal rotation. The novel mid-infrared source was applied to detect the Doppler-broadened fundamental ν_3-asymmetric stretch vibration of methane (CH_4) by direct absorption spectroscopy and wavelength modulation spectroscopy. Cavity-enhanced tunable difference frequency generation proves to be a useful scheme whenever low power consumption and no need for cooling are important. It has great potential for application in high resolution infrared spectroscopy, remote sensing of the atmosphere, and environmental and industrial process monitoring of CO, CO_2, CH_4, NO_2, SO_2, and hydrocarbons in the chemical and petroleum industry. We present absorption line strength calculations for carbon monoxide (CO) and nitric oxide (NO) as well as design consideration of a tunable cw infrared difference-frequency sensor based on low power single mode diode lasers and silver thiogallate, for monitoring these gas species.