LASER-INDUCED FLUORESCENCE SPECTROSCOPY OF ZIRCONIUM MONOCARBIDE

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Laser-ablated Zr metal is found to react with methane under supersonic jet-cooled conditions. New electronic bands in the 540-655 nm region have been detected by laser-induced fluorescence. Among these are bands which do not change when CD₄ is substituted for CH₄ and whose lower state B value is 0.5262 cm⁻¹; wavelength-resolved fluorescence indicates a lower state vibrational frequency of approximately 880 cm⁻¹, suggesting that the carrier is ZrC. Analysis of the high resolution spectra is complicated by irregularities in the Zr isotope structure, indicating severe rotational perturbations. The derived bond length of r° = 1.730 Å is consistent with those found in other 4d transition metal monocarbides.