JET-COOLED ELECTRONIC SPECTROSCOPY OF ZrC

ANTHONY J. MERER and JAMES R.D. PEERS, *Department of Chemistry, University of British Columbia, Vancouver, BC, Canada V6T 1Z1*; SCOTT J. RIXON, *Department of Physics and Astronomy, University of British Columbia, 6224 Agricultural Road, Vancouver, BC, Canada V6T 1Z1*.

Zirconium monocarbide is produced in high yield from the reaction of laser- ablated Zr metal with a helium/methane (1%) gas mixture under supersonic free jet conditions. The ground state is $X^1\Sigma^+$, but the low-lying $a^3\Sigma^+$ state has also been identified by high-resolution laser-induced fluorescence; this has $T_0 = 690\ cm^{-1}$ and $\omega_e = 885\ cm^{-1}$. Molecular constants have been derived for ^{90}ZrC (51.45% natural abundance) for both states; the corresponding constants of the minor isotopomers ^{92}ZrC (17.15%) and ^{94}ZrC (17.38%) have also been determined for $a^3\Sigma^+$, and scale isotopically within experimental error. The principal electronic bands in the visible region form a strongly perturbed $^3\Pi_r - a^3\Sigma^+$ system, of which the origin band has been analysed in detail. The perturbations in the $^3\Pi_r$ state appear to be caused by singlet states.