MOLECULAR BEAM SPECTROSCOPIC STUDIES OF TRANSITION METAL CONTAINING RADICALS

TIMOTHY C. STEIMLE, *Department of Chemistry and Biochemistry, Arizona State University, Tempe, Az, 85287-1604*.

This oration will focus on four subjects: a) the experimental approaches utilized in the studies of molecular beam samples of metal containing radicals, b) the comparison of the permanent electric dipole moments, μ, of early transition metal diatomic molecules, c) optical spectroscopy of transition metal dicarbides, and d) new directions using absorption based spectroscopy.

The experimental database of μ values for early 3*d* and 4*d* transition metal sulfides, oxides and nitrides is now extensive enough to examine ligand-induced trends in the ionic nature of bonding[1]. The validity of a simple, single configuration molecular orbital correlation diagram will be described. The third topic is a report on the analysis of the high resolution optical spectrum of YCC, being performed in collaboration with Prof. A.J. Merer(U.B.C.), and the preliminary analysis of a low resolution optical study of what we beleive to be PtCC. Yttrium dicarbide is the only gas-phase metal dicarbide to be detected via an optical spectroscopic technique[2]. The correlation of the determined physical properties to their proposed role as catalytic agents in the formation of single walled nanotubes[3] will also be presented. Absorption based transient frequency modualtion (FM) spectroscopy[4,5] will be proposed as a new direction for the study of metal containing molecules in light of our recent comparison of this technique with LIF for TiS and PtC[6].

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