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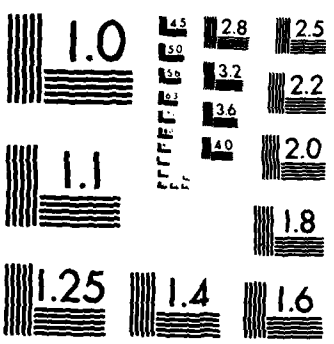

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Several new vapor phase chemiluminescent reactions between alkali atoms and halide molecules were discovered which produce visible emission from electronically excited molecules.

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OFFICE OF NAVAL RESEARCH

Final Report

on

Alkali Atom - Tetrahaloethylene Chemiluminescent Reactions

Task No. NR 051-847

Contract N00014-83-K-0533

John J. Wright, Principal Investigator

Physics Department

University of New Hampshire

Durham, NH 03824

603-862-2898

July 1983 - August 1986, $87,093

The object of this research project was to investigate new vapor phase chemiluminescent reactions between alkali atoms and halide molecules in order to discover promising candidates for short-wavelength chemical lasers. Many reactions were studied and several of these were found to produce visible emission from electronically excited molecules. Five of these reactions produced molecules that had either vibrationally inverted populations in the excited state or had transitions to high lying vibrational levels of the ground state, making them potential chemical laser candidates. These results have been reported in technical reports and in the publications listed below. Previous end of the year reports discuss several reactions which were studied but were not of sufficient interest to warrant publication.

Personnel:

J.J. Wright, Principal Investigator

L.C. Balling, Faculty Associate

K..K. Lin, Graduate Student

Publications:

1) **Alkali-SCl_2 Chemiluminescence: Vibrational Polulation Inversion in the B state of S_2**, J.J. Wright and L.C. Balling, Chem. Phys. Letters 108, 214 (1984)

2) **NaK Chemiluminescence**, J.J. Wright and L.C. Balling, Chem. Phys. Letters 112, 117 (1984)

3) **Alkali Atom - $SbCl_5$ Reactions: Blue-Green Chemiluminescence from an Inverted Population in SbCl**, J.J. Wright and L.C. Balling, Chem. Phys. Letters 118, 364 (1985)

4) **Te_2 Chemiluminescence from Alkali Atom-$TeCl_4$ Reactions** K.K. Lin, L.C. Balling and J.J. Wright, Chem. Phys. Letters 123, 37 (1986)

5) **Chemiluminescence from Excited C_2^--Alkali Cation Complexes formed in Alkali Atom - Halocarbon Flames**, K.K. Lin, L.C. Balling and J.J. Wright, Submitted to Chem. Phys. Letters

6) **PS Chemiluminescence from Alkali - $PSCl_3$ Reactions**, K.K. Lin, L.C. Balling and J.J. Wright, To be submitted to Chem. Phys. Letters.

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