FTMW/CVI: FOURIER TRANSFORM MICROWAVE / COHERENCE SPECTROSCOPY WITH VIRTUAL INSTRUMENTS

JENS-UWE GRABOW, *Lehrgebiet Physikalische Chemie A, Institut für Physikalische Chemie und Elektrochemie, Callinstrasse 3-3a, Universtät Hannover, D-30167 Hannover.*

Modern Fourier transform microwave (FTMW) spectroscopy, first implemented as an impulse excitation technique in a steady gas-waveguide apparatus[a], started only a quarter of a century ago. Soon after, the method was supplemented for special applications, e.g. Stark-effect[b], double resonance[c], and 2D[d] spectroscopy. The subsequent implementation of the technique in a supersonic jet-resonator apparatus[e] was followed by similar developments, i.e. Stark-effect[f], double resonance[g], laser ablation[h], and DC-discharge[i]. Automation[j] along with the "coaxially oriented beam-resonator arrangement"[k] (COBRA) has greatly increased efficiency, resolution, and sensitivity of current FTMW spectrometers.

We present the implementation of a complete COBRA-FTMW spectrometer featuring the capabilities given above. The entire experiment is operated, either interactivle or automatically, by a graphical user interface (GUI)-based program which is capable of waveguide and resonator applications. Developed in the C programming language, while following the concept of virtual instruments (VI), the software can co-operate with a wide variety of PCI and IEEE hardware components to build the instrument. Only one application specific logic circuit, which will also be presented, is needed.

---

[a] J. Ekkers and W. H. Flygare, Rev. Sci. Instrum. 47, 448(1976).
[b] G. Bestmann and H. Dreizler, Z. Naturforsch. 37a, 615(1982).
[c] H. Dreizler, E. Fliege, H. Mäder, and W. Stahl, Z. Naturforsch. 37a, 1266(1982).
[d] D. A. Andrews and J. G. Baker, J. Phys. B20, 5705(1987).
[e] T. J. Balle and W. H. Flygare, Rev. Sci. Instrum. 52, 33(1981).
[f] L. H. Coudert, F. J. Lovas, R. D. Suenram, and J. T. Hougen, J. Chem. Phys. 87, 6290(1987).
[g] L. Martinache, S. Jans-Bürli, B. Vogelsanger, W. Kresa, and A. Bauder, Chem. Phys. Lett. 149, 424(1988).
[h] R. D. Suenram, F. J. Lovas, and K. Matsumura, Ap. J. Lett. 342, L103(1989).
[i] J.-U. Grabow, N. Heineking, and W. Stahl, Z. Naturforsch. 46a, 914(1991).
[j] U. Andresen, H. Dreizler, J.-U. Grabow and W. Stahl, Rev. Sci. Instrum. 61, 3694(1990).
[k] J.-U. Grabow and W. Stahl, Z. Naturforsch. 45a, 1043(1990)