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<p>The equipment purchased on this grant falls into three categories: The first consists of components for four apparatus systems used for the study of oscillatory reactions and the effects of external periodic perturbations on such reactions. The second category includes generally used instrumentation including a storage oscilloscope, a visible spectrometer, a thermostat bath, an analytical balance, a ph meter and strip chart recorder. The third category is computers and components including upgrading for laboratory computers on hand, computer networking hardware, computer data acquisition elements (both hardware and software) used in all the experiments as well as theoretical work, associated with the experiments. (mgm) ←</p>			
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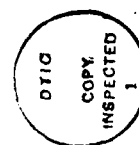
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**Senior Research Personnel:**

Principal Investigator, Professor John Ross  
Chemistry Department  
Stanford University  
Stanford, CA 94305



Mark A. Schell  
Benjamin Irvin

**Junior Research Personnel:**

Jean-Marie Bodet  
Timothy S. Chevalier  
Robert H. Harding  
Jesse Kramer  
Mel LeVan  
Arnaud Pagola  
Spencer Pugh

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### **Abstract of Objectives and Accomplishments**

The equipment purchased on this grant falls into three categories:

The first consists of components for four apparatus systems used for the study of oscillatory reactions and the effects of external periodic perturbations on such reactions. The components include peralstaltic pumps, flow meters, chart recorder, distillation unit, circulation water bath, spectrometer, flow meters. One apparatus has been used extensively for the study of the oscillatory combustion of acetaldehyde with oxygen in which we observed periodic and quasi periodic responses to external periodic perturbations. We also studied the imposition of two simultaneous periodic perturbations which leads to hysteresis and a variety of responses observed for the first time. In the second apparatus we have studied the response of a liquid phase reaction to external perturbations, have observed a super critical Hopf bifurcation and the generation of an attracting 2-torus from stable limit cycle. In the third apparatus we are studying the efficiency of the combustion of methane with steady and oscillatory input of reactants. In the forth apparatus we are studying chemical pumps and the thermodynamic efficiency. All these studies lead to enhanced determination of complex reaction mechanisms.

The second category includes generally used instrumentation including a storage oscilloscope, a visible spectrometer, a thermostat bath, an analytical balance, a ph meter and strip chart recorder used in the experiments described in the previous paragraph and, in addition, in the experiments on chemical waves and periodic precipitation processes. We have measured a variety of properties on kinematic waves, trigger waves

and phase waves including velocity front profile and dispersion relations. Extensive measurements have been made in periodic precipitation processes by means of absorption and reticon techniques, microscope observation and standard analytical methods in order to obtain the temporal developments of band formation, propagation of the precipitation front, spatial distribution of total precipitate, particle density and variation of average particle radius.

The third category is computers and components including upgrading for laboratory computers on hand, computer networking hardware, computer data acquisition elements (both hardware and software) used in all the experiments as well as theoretical work, associated with the experiments including the study of entrained (periodic) response to periodic perturbations of an oscillatory chemical system, colloidal growth, systems with multiple stationary and the subjects mentioned in the prior paragraphs.