

State of California  
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 06-37

November 16, 2006

Agenda Item No.: 06-10-2

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a research proposal, number 2620-253, entitled "Deployment of a Novel Aerosol Mobility/Mass Spectrometer for Quantitative Chemical Analysis of Organic Aerosols from Mobile Sources," has been submitted by the University of Southern California;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval;

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

Proposal Number 2620-253, entitled "Deployment of a Novel Aerosol Mobility/Mass Spectrometer for Quantitative Chemical Analysis of Organic Aerosols from Mobile Sources," submitted by University of Southern California, for a total amount not to exceed \$245,338.

NOW, THEREFORE BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

Proposal Number 2620-253, entitled "Deployment of a Novel Aerosol Mobility/Mass Spectrometer for Quantitative Chemical Analysis of Organic Aerosols from Mobile Sources," submitted by University of Southern California, for a total amount not to exceed \$245,338.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein, and as described in Attachment A, in an amount not to exceed \$245,338.

I hereby certify that the above is a true and correct copy of Resolution 06-37, as adopted by the Air Resources Board.

Lori Andreoni  
Lori Andreoni, Clerk of the Board

## ATTACHMENT A

### **“Deployment of a Novel Aerosol Mobility/Mass Spectrometer for Quantitative Chemical Analysis of Organic Aerosols from Mobile Sources”**

#### **Background**

Aerosols affect human health, visibility, and climate. The most important factors in these effects are particle size, concentration, and chemical composition. Real time measurements of the first two (physical) parameters are relatively easily accomplished with off the shelf instruments, whereas real-time measurements of compound concentrations remain a challenge. The proposed work describes a new instrument that employs chemical ionization mobility/mass spectroscopy (CIMMS) to quantify organic compounds in a particle-size specific manner.

#### **Objective**

The proposed research has two primary objectives: 1) demonstrate the ability of the newly developed instrument – CIMMS – to quantitatively measure organic compounds in the fine and ultra fine size fractions of ambient aerosols in near-real time, and 2) conduct field studies of important sources of particles within the South Coast Air Basin – port of Los Angeles (LA) emissions, near freeway particles, Los Angeles International Airport (LAX) emissions, and secondary aerosol formation in Riverside.

#### **Methods**

The project is divided into two phases. Phase 1 of the project will demonstrate the performance of CIMMS in measurement of organic compounds contained in aerosols. Calibration of the instrument will be conducted in the laboratory using organic standards. In addition, two local field deployments of CIMMS will be carried out: Long Beach – Port of LA and I-100 freeway field studies. A written report will be prepared that details CIMMS characterization and calibration and some initial analysis of data from the two field studies. Review and approval of this report by the RSC is required before phase 2 may be started. Phase 2 will consist of two further field studies, data analysis and completion of a final report. The field work will determine aerosol composition near LAX and secondary aerosol composition in Riverside.

#### **Significance to the Board**

The proposed measurements using the newly developed instrument CIMMS would add a tremendous wealth of scientific information concerning particle distribution, temporal variation, size-specific composition and atmospheric transformations in source-dominated areas of high interest to ARB. Specifically, deployment of CIMMS near the LA port will provide new measurements of organic primary emissions from ships; this data may impact how that source is treated in models. In-situ analysis of near-freeway particles will determine the chemical composition and evolution of these organic particles. Size-resolved composition of the highly concentrated aerosol near LAX will provide unique information about aircraft sources of PM. Finally, quantitative identification of organic compounds in aerosols in Riverside will help in the determination of tracers for secondary aerosols.

**Expected Results**

This work should make significant contributions to the understanding of the chemical composition and evolution of aerosols in the South Coast Air Basin, and to future health, air pollutant formation, and climate change studies.

**Contractor:**

University of Southern California

**Contract Period:**

24 months

**Principal Investigator (PI):**

Professor Denis Phares

**Contract Amount:**

\$245,338

**Basis for Indirect Cost Rate:**

The State and USC have agreed to a thirty percent indirect cost rate.

**Past Experience with this Principal Investigator:**

The PI has extensive experience with construction and deployment of aerosol mass spectrometers. Currently, the PI is developing, testing, and calibrating a CIMMS instrument; this work is being funded by the U.S. EPA Star program under a project entitled, "Development and deployment of an aerosol mobility/mass spectrometer for analysis of organic aerosols." This project has so far resulted in the development and successful testing of the aerosol inlet, ion mobility cell, ion focusing region, and mass spectrometer. Publications describing the instrument design and performance are expected to be prepared during the fall of this year.

**Prior Research Division Funding to USC:**

Year	2005	2004	2003
Funding	\$1,139,284	\$0	\$0

# BUDGET SUMMARY

University of Southern California

Deployment of a Novel Aerosol Mobility/Mass Spectrometer for Quantitative Chemical  
Analysis of Organic Aerosols from Mobile Sources

## DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$140,056
2.	Subcontractors	\$ 0
3.	Equipment	\$ 30,666
4.	Travel and Subsistence	\$ 0
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 2,000
7.	Mail and Phone	\$ 0
8.	Supplies	\$ 11,000
9.	Analyses	\$ 0
10.	Miscellaneous	\$ 0
	Total Direct Costs	\$ 183,722

## INDIRECT COSTS

1.	Overhead	\$ 56,616
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	\$ 0
	Total Indirect Costs	\$ 56,616

**TOTAL PROJECT COSTS** **\$ 240,338**