File 266:FEDERAL RESEARCH IN PROGRESS - DEC 1990

4/7/1
1432192 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 16732; VMHMYY542 AGENCY CODE: NIOSH
UPDATE OF COMPLETED COHORT MORTALITY STUDIES
PRINCIPAL INVESTIGATOR: BROWN, DP
PERFORMING ORG.: NIOSH DSHEFS IWSB, CINCINNATI, OH
SPONSORING ORG.: NAT. INST. FOR OCCUPATIONAL SAFETY AND HEALTH
DATES: 8210 TO 0000 FY : 86 TYPE OF AWARD: IN-HOUSE
SUMMARY: GOAL: To evaluate the human health effects of chemicals and/or mixtures, in commerce or occupations, epidemiologic studies will be conducted. HOW: These are epidemiologic studies that assess the association between exposure and the risk of developing disease (primarily cancer). ACMP86: Complete final reports for the update of studies on styrene butadiene rubber and pesticides. Complete analysis of attapulgite clay and vinyl chloride studies. ACMP87: Complete reports for attapulgite clay and vinyl chloride. ACMP88: Complete reports for cohorts selected for updating in FY86. METH: A number of retrospective cohort mortality studies have been completed by DSHEFS during the past ten years, many of which lacked conclusive results. The primary reasons for inconclusive results are too few deaths (low statistical power) and a short follow-up period (resulting in a short latency period). Thus, many of the original hypotheses that were tested by these studies remain unresolved questions. Through this project, cohorts from previous NIOSH studies will be followed through 1982, additional death information will be added to the file, the analysis will be rerun, and new reports will be prepared. Therefore, the reanalysis will include a greater number of deaths (increasing the statistical power) and the latency period will be extended five to ten years (depending on the individual study). Both of these factors should add significant information allowing for a more valid interpretation of the study results and a better answer to the research questions.

4/7/5
1444812 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 8806975; 8806975 AGENCY CODE: NSF
Vibrational Spectra and Structure of Macromolecules
PRINCIPAL INVESTIGATOR: Krimm, S. . Dr.
PERFORMING ORG.: University of Michigan Ann Arbor, Biophysics Research Div., Ann Arbor, MI 48109-1220
PROJECT MONITOR: Norbert M. Bikales
SPONSORING ORG.: National Science Foundation, DIVISION OF MATERIALS RESEARCH, Washington, D.C., 20550
DATES: 880615 TO 891130 FY : 88 FUNDS: $130,000 TYPE OF AWARD: Continuing Grant-New Awd, Pri Rel Proj
SUMMARY: Theoretical methods, such as normal mode analysis and ab initio calculations, are being combined with experimental studies to provide rigorous analyses of infrared and Raman spectra of macromolecules in terms of their structures and morphologies. The present research covers five areas: (1) a study of the longitudinal acoustic mode in poly(ethylene oxide) as an example of a helical polymer, incorporating normal mode analyses of the effects of intermolecular forces and chain defects on this

mode; (2) a study of chain conformations in chlorinated poly(vinyl chloride) by normal mode analysis, involving refinement of a force field for vicinally chlorinated hydrocarbons; (3) a study of surface enhanced Raman spectra of poly(vinylpyridine) in order to characterize the interaction of the polymer with a metal surface, starting with a detailed normal node analysis of such spectra of the monomer; (4) a study of spectra and structure in polyprolines, based on a refinement of a force field for the imide group in N,N-dimethylacetamide; and (5) a study of the dependence of polypeptide force field on conformation, based on ab initio calculations on dipeptides. These studies will provide new insights into general and specific features of the relationships between spectra and structure of macromolecules.

4/7/6
1496028 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 010777 AGENCY CODE: SBIR
BIODEGRADATION OF VOLATILE, HALOGENATED, ALIPHATIC COMPOUNDS
PRINCIPAL INVESTIGATOR: MICHAEL NELSON (206)883-1900
PRINCIPAL INVESTIGATOR
PERFORMING ORG.: ECOVA CORP 3820 159TH AVE NE, REDMOND, WA 98052
SPONSORING ORG.: NSF
DATES: 0089 FY : 00 FUNDS: $44,114 TYPE OF AWARD: Phase 1
SUMMARY: VOLATILE HALOGENATED ALIPHATIC COMPOUNDS (VHALS) ARE PREDOMINANT CONTAMINANTS AT HAZARDOUS WASTE SITES. TRICHLOREOTHYLENE (TCE) IS THE MOST COMMONLY OCCURING COMPOUND IN THIS CLASS. THESE COMPOUNDS ARE PERSISTENT AND THEREFORE REQUIRE SOME FORM OF REMEDIATION OF REMOVAL. PRESENT TECHNOLOGY UTILIZES CARBON ADSORPTION, WHICH MEANS TRANSFERRING THE HAZARDOUS COMPOUNDS TO ANOTHER MEDIUM WHICH MUST BE DECONTAMINATED BY COMBUSTION. THE PROPOSED PROJECT INTENDS TODEVELOP AN ALTERNATIVE TECHNOLOGY UTILIZING MICROBIAL DEGRADATION FOR REMEDIATION OF VHAL-CONTAMINATED SITES. THE STUDY WILL TEST MODEL LABORATORY-SCALE BIOREACTORS FOR DEGRADATION OF TCE IN WATER USING THE MICROORGANISM STRAIN G4, PREVIOUSLY ISOLATED AND SHOWN TO DEGRADE TCE TO NONTOXIC PRODUCTS. THE ORGANISM WILL ALSO BE ASSESSED FOR ITS ABILITY TO DEGRADE OTHER VHALS OF ENVIRONMENTAL CONCERN INCLUDING TETRACHLOROETHYLENE, DICHLOROETHYLENE, VINYL CHLORIDE, AND L.L.L TRICHLOROETHANE. THE EFFICIENCY OF VHALS DEGRADATION BY STRAIN G4 WILL BE COMPARED TO OTHER MICROORGANISMS TO DETERMINE THE ORGANISMS THAT ARE MOST EFFECTIVE FOR APPLICATION. THE RESULTS WILL BE USED TO PREPARE A COST ANALYSIS FOR USING THIS TECHNOLOGY AS COMAPRED TO CARBON ADSORPTION. THE PROJECT SHOULD CULMINATE IN THE DEVELOPMENT OF A RAPID AND COST-EFFECTIVE METHOD FOR ONSITE DETOXIFICATION OF VHALS.
PROGRESS REPORT SUMMARY: THE POTENTIAL COMMERCIAL APPLICATION AS DESCRIBED BY THEAWARDEE: RESEARCH WILL LEAD TO THE DEVELOPMENT OF ABIOREMEDIATION PROCESS THAT WILL REMOVE TRICHLOROETHYLENE(TCE) AND OTHER VOLATILE, HALOGENATED, ALIPHATIC COMPOUNDS(VHALS) FROM SOIL, GROUNDWATER AND WASTESTREAMS.

4/7/7
1489087 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 001308 AGENCY CODE: SBIR
FEASIBILITY OF IN-SITU BIODEGRADATION OF CHLORINATED ETHENES IN

CONTAMINATED AQUIFERS
PRINCIPAL INVESTIGATOR: SAMUEL FOGAL (617)232-2207
PERFORMING ORG.: CAMBRIDGE ANALYTICAL ASSOC INC 1106 COMMONWEALTH AVE, BOSTON, MA 02215
SPONSORING ORG.: EPA
DATES: 85 FY : 84 FUNDS: $185,620 TYPE OF AWARD: Phase 1 and Phase 2

SUMMARY: THE CHLORINATED ETHENES, VINYL CHLORIDE, VINYLIDINE CHLORIDE, TRICHLOROETHYLENE, AND TETRACHLOROETHYLENE HAVE BEEN DETECTED IN GROUNDWATER THROUGHOUT THE UNITED STATES. VINYL CHLORIDE AND VINYLIDINE CHLORIDE ORIGINATE FROM INDUSTRIAL WASTE DISPOSAL SITES AS WASTE PRODUCTS OF PLASTIC MANUFACTURING AND TRICHLOROETHYLENE IS WIDELY USED AS AN INDUSTRIAL SOLVENT. SINCE THESE COMPOUNDS ARE HIGHLY TOXIC, IT IS NECESSARY TO DEVELOP METHODS FOR THEIR REMOVAL FROM CONTAMINATED DRINKING WATER AQUIFERS. THE CONTAMINATION CAUSED BY THESE COMPOUNDS IS FREQUENTLY EXTENSIVE AND THEREFORE NOT ABLE TO BE TREATED COST-EFFECTIVELY BY EXISTING TECHNOLOGIES. THE INVESTIGATORS PROPOSE TO EVALUATE THE FEASIBILITY OF IN-SITU BIOLOGICAL TREATMENT OF THESE CONTAMINATED AQUIFERS. THEY HAVE IDENTIFIED THREE MICROBIOLOGICAL PROCESSES WHICH HAVE A HIGH PROBABILITY OF ACHIEVING THE COMPLETE BIODEGRADATION OF CHLORINATED ETHENES AND PROPOSE TO DEMONSTRATE THIS USING 14(C) LABELED VINYL CHLORIDE AND 14(C) TRICHLOROETHYLENE. TWO TYPES OF MICROORGANISMS, AEROBIC AND ANAEROBIC, WILL BE ISOLATED FROM SEDIMENTS TAKEN FROM A DISCHARGE AREA OF A CONTAMINATED AQUIFER. TEST COMPOUNDS AT CONCENTRATION FROM 10 TO 1000 UG/1 WILL BE INCUBATED INDIVIDUALLY WITH AEROBIC AND ANAEROBIC ORGANISMS AND WITH A SEQUENTIAL COMBINATION OF THOSE CULTURES. CHEMICAL INTERMEDIATES WILL BE IDENTIFIED BY GC AND GC/MS (14)CH4 AND (14)CO2 WILL BE MEASURED BY LIQUID SCINTILLATION COUNTING. THE RESULTS SHOULD ENABLE THEM TO DESIGN SPECIFIC AQUIFER RESTORATION PLANS IN WHICH THE SUBSURFACE ENVIRONMENT IS MODIFIED TO CREATE A MICROBIOLOGICAL BARRIER ACROSS THE PATH OF AN APPROACHING CONTAMINANT PLUME.

4/7/8
1489697 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 002613 AGENCY CODE: SBIR
THE BIODEGRADATION OF CHLORINATED ALIPHATIC ALIPHATIC COMPOUNDS BY METHANE-UTILIZING BACTERIA: MECHANISM AND
PRINCIPAL INVESTIGATOR: SAMUEL FOGEL (617)232-2207
DIR CHEMICAL CONS DIV
PERFORMING ORG.: CAMBRIDGE ANALYTICAL ASSOC 1106 COMMONWEALTH AVE, BOSTON , MA 02215
SPONSORING ORG.: NSF
DATES: 87 FY : 00 FUNDS: $240,000 TYPE OF AWARD: Phase 1 and Phase 2

SUMMARY: BIODEGRADATION/METHANOTROPHS/CHLOROETHENES/CHLOROETHANES/ CHLORO METHANE/WASTEWATER LOW MOLECULAR WEIGHT CHLORINATED HYDROCARBONS ARE WIDESPREAD ENVIRONMENTAL CONTAMINANTS AND ARE OF CONCERN BECAUSE OF THEIR TOXIC AND CARCINOGENIC PROPERTIES. THEY ARE PERSISTENT IN SOILS AND GROUNDWATER, RESIST DEGRADATION IN BIOLOGICAL WASTEWATER TREATMENT SYSTEMS, AND ARE EXPENSIVE TO REMOVE FROM WATER BY PHYSICAL/CHEMICAL PROCESSES. WE HAVE ISOLATED A BACTERIUM WHICH GROWS BY OXIDIZING METHANE (A METHANOTROPH) AND WHICH CAN ALSO OXIDIZE AND DEGRADE VINYL CHLORIDE, VINYLIDENE CHLORIDE,

ALL DICHLOROETHYLENES, AND TRICHLOROETHYLENE, PLUS TWO CHLORINATED ETHANES AND TWO CHLOROMETHANES. THIS DISCOVERY HAS SIGNIFICANT POTENTIAL FOR APPLICATIONS IN THE FIELD OF GROUNDWATER AND WASTEWATER TREATMENT. OUR PRELIMINARY EXPERIMENTS WITH 14C-TRICHLOROETHYLENE BIODEGRATDATION DEMONSTRATED THAT AT LEAST 60% OF THE 14C COULD BE RECOVERED AS 14C02 AND 14C-BIOMASS. BASED ON REPORTED REACTION MECHANISMS FOR THE OXIDATION OF CHLORINATED ETHENES IN MAMMALIAN SYSTEMS, WE HAVE DETERMINED THAT THE INITIAL OXIDATION PRODUCTS SHOULD BE DEGRADABLE BY BACTERIA. WE PROPOSE TO CARRY OUT EXTENSIVE CHEMICAL ANALYSIS OF THE PRODUCTS OF METHANOTROPHIC DEGRADATION OF THE SELECTED CONTAMINANTS IN ORDER TO DEMONSTRATE FOR EACH ONE THAT NO TOXIC PRODUCTS ARE FORMED. WE ALSO PROPOSE TO OPERATE A LABORATORY-SCALE TREATMENT COLUMN EMPLOYING OUR METHANOTROPHIC ISOLATE AND TO OPTIMIZE CONDITIONS FOR THE REMOVAL OF CHLORINATED ALIPHATICS FROM CONTAMINATED WATER.

PROGRESS REPORT SUMMARY: A METHANOTROPHIC WASTEWATER TREATMENT SYSTEM USED TO TREATGROUNDWATER OR WASTEWATER CONTAMINATED WITH CHLORINATEDALIPHATIC CHEMICALS. THIS SYSTEM CAN ALSO BE USED INSEQUENCE WITH EITHER GRANULAR ACTIVATED CARBONOR AIR-STRIPPING.

4/7/9
1492782 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS

IDENTIFYING NO.: 007476 AGENCY CODE: SBIR

FEASIBILITY OF BIODEGRADATION OF TETRACHLOROETHYLENE IN CONTAMINATED AQUIFERS

PRINCIPAL INVESTIGATOR: SAMUEL FOGEL PHD

PERFORMING ORG.: CAMBRIDGE ANALYTICAL ASSOC 1106 COMMONWEALTH AVENUE, BOSTON, MA 02215

SPONSORING ORG.: NSF

DATES: 0088 FY : 00 FUNDS: $50,000 TYPE OF AWARD: Phase 1

SUMMARY: TETRACHLOROETHYLENE, ANAEROBIC, AEROBIC, MICROBIOLOGICAL, SEQUENTIAL, METHANOGEN, BIOREMEDIATION. CHLORINATED SOLVENTS SUCH AS TETRACHLOROETHYLENE, HAVE BEEN SPILLED AND DISPOSED OF ON SOIL AND HAVE BEEN TRANSPORTED TO THE GROUND WATER, CAUSING WIDESPREAD AQUIFER CONTAMINATION. THESE COMPOUNDS ARE OF CONCERN BECAUSE OF THEIR TOXICITY AND SUSPECTED CARCINOGENICITY. CHLORINATED SOLVENTS HAVING THREE OF FEWER CHLORINE ATOMS ARE READILY DEGRADED UNDER AEROBIC CONDITIONS BY METHANE-UTILIZING BACTERIA. TETRACHLOROETHYLENE, HOWEVER, CAN NOT BE DEGRADED BY THOSE AEROBIC BACTERIA. TETRACHLOROETHYLENE CAN, HOWEVER, BE PARTIALLY DECHLORINATED BY ANAEROBIC BACTERIA. CAA BIOREMEDIATION SYSTEMS PROPOSES TO DEVELOP A SEQUENTIAL ANAEROBIC/AEROBIC BIODEGRADATION PROCESS TO BE APPLIED IN THE IN SITU TREATMENT OF TETRACHLOROETHYLENE CONTAMINATED AQUIFERS. THE FEASIBILITY OF THIS APPROACH IS TO BE DEMONSTRATED IN A LABORATORY SCALE AQUIFER SIMULATOR IN WHICH GROUND WATER IS SELECTIVELY AMENDED TO STIMULATE GROWTH OF APPROPRIATE MICROBIAL COMMUNITIES AND IS RECIRCULATED THROUGH CONTAMINATED SOIL. TETRACHLOROETHYLENE IS EXPECTED TO DEGRADE TO TRICHLOROETHYLENE, DICHLOROETHYLENE, AND VINYL CHLORIDE UNDER ANAEROBIC CONDITIONS. IN THE SECOND STEP, THESE COMPOUNDS WILL BE MINERALIZED BY THE METHANE-UTILIZING BACTERIA.

PROGRESS REPORT SUMMARY: THE PROPOSED RESEARCH WILL RESULT IN THE DEVELOPMENT OF AWELL DEFINED SEQUENTIAL BIOLOGICAL PROCESS FOR THETREATMENT OF TETRACHLOROETHYLENE. TWO APPLICATIONS OF THETREATMENT PROCESS, IN SITU AQUIFER TREATMENT AND ABOVEGROUND BIOREACTOR TREATMENT WILL BE COMMERCIALLY

DEVELOPEDBY CAA BIOREMEDIATION SYSTEMS.

4/7/11
1449303 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 8902772; 8902772 AGENCY CODE: NSF
Co-Metabolic Inhibition Kinetics of Chlorinated Hydrocarbon Degradation by Methane- and Propane Oxidizers
PRINCIPAL INVESTIGATOR: Strand, S.E. Dr.
PERFORMING ORG.: University of Washington, College of Forest Resources, Seattle, WA 98195
PROJECT MONITOR: Edward H. Bryan
SPONSORING ORG.: National Science Foundation, DIV OF BIOLOGICAL AND CRITICAL SYSTEMS, Washington, D.C., 20550
DATES: 890701 TO 901231 FY : 89 FUNDS: $112,834 TYPE OF AWARD: Continuing Grant-New Project
SUMMARY: This is an award to provide support for research on the biological degradation of chlorinated hydrocarbons that are of significance with respect to contamination of water. The specific compounds being investigated are 1, 1, 1-trichloroethane, trichloroethylene, and vinyl chloride. Previous work has shown that these compounds can be degraded aerobically by methane and propane oxidizing bacteria but has neglected
the competitive effects of the growth substrate and the chlorinated hydrocarbons on the rate of degradation. In this work, the effects of methane and propane levels on the degradation rate of the target compounds will be determined and the results applied to developments of model sequencing batch reactors for degradation of those compounds. A mathematical model that can be utilized in
the engineering design of bioreactors for treatement of wastes containing chlorinated hydrocarbons is the expected result of this research. Successful completion of this research will provide information that is essential for design of high-rate, aerobic biological systems for destruction of chlorinated hydrocarbons of pollutional significance.

4/7/12
1510658 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 0142742; 3620-41000-027-00D AGENCY CODE: AGRIC
CORNSTARCH-BASED BIODEGRADABLE MOLDED PLASTICS
PRINCIPAL INVESTIGATOR: SWANSON C L
ASSOCIATE INVESTIGATORS: JASBERG B J; DOANE W M
PERFORMING ORG.: NORTHERN REGIONAL RES CENTER, PEORIA, ILLINOIS 61604
SPONSORING ORG.: U. S. DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE
DATES: 880215 TO 910215
SUMMARY: OBJECTIVE: Prepare composites containing various levels of starch (10-90%) and polyethylene, poly (vinyl chloride) or polystyrene (90-10%) suitable for injection molding. Mold and evaluate test samples to determine properties and optimize performance.
APPROACH: Initially cornstarch will be evaluated as a replacement in part or in total for clays and other mineral fillers in molded plastics. The major synthetic resins used to make multibillion pounds of molded plastics, polyethylene, poly (vinyl chloride), and polystyrene will be compounded with various levels of starch and other additives to provide

homogenous composites. Selectively modified starches will be used if needed for increased compatibility. Test samples prepared in state-of-the-art injection molding equipment will be evaluated for biodegradability, strength and flexibility to optimize performance.

PROGRESS REPORT SUMMARY: PROGRESS: Renovation of an area for the polymer processing laboratory was completed and processing equipment was consolidated in the area. Rigid composite plastic tensile test specimens containing 20% starch in a high-density polyethylene matrix were successfully injection molded on the 75-ton 4 oz.-shot injection molding machine. Compounding of starch-plastic composite material by a single pass through a twin-screw extruderwas demonstrated. Physical properties of the starch-plastic composite specimens were strongly related to starch and moisture content, but wereinsensitive to temperature, screw speed and feed rate. A mold is beingpurchased to produce degradable transplanting pots to test for automated planting of seedlings in fields without accumulation of pots in the soil.

4/7/15
1502258 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 0099815; CA-B*-FPL-4739-MS AGENCY CODE: AGRIC
CHEMISTRY OF SURFACE MODIFICATION AND SURFACE PROCESSES OF WOOD
PRINCIPAL INVESTIGATOR: ZAVARIN E
PERFORMING ORG.: UNIV OF CALIFORNIA, FOREST PRODUCTS LABORATORY, BERKELEY , CALIFORNIA 94720
SPONSORING ORG.: U. S. DEPARTMENT OF AGRICULTURE, COOPERATIVE STATE RES SER
DATES: 861001 TO 910930
SUMMARY: OBJECTIVE: Study of chemical effects of treating solid wood with radio-frequency plasma. Determination of chemical mechanism of wood bonding by oxidative surface activation and optimization of methods.

APPROACH: Subject lignocellulosics to radio-frequency plasmas for various time periods, gas pressures and power. Gases to include O(2), N(2), and He which degrade wood surface and vapors of organic monomers which can attach to wood surface. Effects will be evaluated by chemical analysis. Wood bonding mechanism will be studied using model compounds and results analyzed by modern chemical methods. Bonding procedure will be optimized based on the results of fundamental studies.

PROGRESS REPORT SUMMARY: PROGRESS: Cotton fibers were imbedded into the vinyl chloride (87%)/vinyl acetate (13%) copolymer (VC/VA) to form a fiber reinforced polymer (FRP) with and without radiofrequency plasma preactivation of the two components. Preactivation of the cellulose fiber (Helim, 280 W, 0.3 Torr, 5 min) produced a peak at 1735 cm in the Fourier Transform Infrared Diffuse Reflectance Spectrum (DRIFTS) indicating introduction of saturatedC=O groups. Preactivation of VC/VA with NH(3) plasma (150 W, 0.7 Torr,180 min) produced a peak at 3137 cm in DRIFTS indicating incorporation of RNH(3)+ groups. Untreated pure VC/VA gave the tensile modulus of 596.2 MPa, tensile strength of 7.91 MPa, and elongation of 2.23%. FRP produced from untreated components (28% of VC/VA) gave a tensile modulus of 1163.9 MPa, tensile strength of 16.27 MPa, and elongation of 2.63%. FRP produced from plasma-treated components (30% VC/VA) gave a tensile modulus of 1094.2 MPa, tensile strength of 19.4 MPa, and elongation of 4.32% (Minimat Tensile Tester of Polymer Labs). FRP

exhibited severe degradation above 140 degrees C in differential scanning calorimetry. Dielectric thermal analysis (Polymer Labs) gave a glass transition temperature(T(g)) of 106 degrees C for the VC/VA polymer, a T(g) of 103 degrees C for FRP made from untreated components, and about the same T(g) for the FRP made from plasma-treated components.

4/7/17
1493487 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 008193 AGENCY CODE: SBIR
PIEZOELECTRIC CRYSTAL PERSONAL MONITORS
PERFORMING ORG.: UNIVERSAL SENSORS 5258 VETERANS MEMORIAL HWY ; SUITE D , METAIRIE, LA 70006
SPONSORING ORG.: HHS
DATES: 0088 FY : 00 FUNDS: $50,000 TYPE OF AWARD: Phase 1
SUMMARY: PIEZOELECTRIC CRYSTALS, AIR POLLUTION DETECTORS, DOSIMETERS, CONTINUOUS ASSAY. PIEZOELECTRIC CRYSTAL DETECTORS WILL BE DEVELOPED AS PERSONAL MONITORS WHICH CAN BE USED TO DETECT EXPOSURE TO TOXIC COMPOUNDS INDOORS, AT WORK-PLACE SITES. CRYSTALS WILL BE COATED WITH SELECTIVE ADSORBENTS FOR THE POLLUTANTS TO BE ASSAYED. DETECTION OF PPB CONCENTRATIONS, EITHER CONTINUOUSLY OR AS A DOSIMETER, WILL BE POSSIBLE. EACH DETECTOR, AND ADSORBENT, WILL BE EVALUATED WITH RESPECT TO SENSITIVITY, ACCURACY, SELECTIVITY, SIMPLICITY OF DESIGN, STABILITY, REVERSIBILITY, SPEED OF RESPONSE, LIMIT OF DETECTION AND LINEARITY OF RESPONSE. AS A RESULT OF RESEARCH IN PHASE I THE FEASIBILITY OF THE USE OF PIEZOELECTRIC CRYSTAL DETECTORS AS BOTH DOSIMETERS AND CONTINUOUS MONITORING DEVICES TO DETECT EXPOSURE TO TOXIC AGENTS WILL BE DEMONSTRATED. THESE DEVICES WILL BE CONSTRUCTED AND TESTED IN PHASE II, AND THEIR USE DEMONSTRATED FOR A HOST OF APPLICATIONS.
PROGRESS REPORT SUMMARY: POTENTIAL COMMERCIAL APPLICATIONS: CUMULATIVE DOSIMETER ORCONTINUOUS PERSONAL MONITORS OF LOW COST, SMALL SIZE, USEFULFOR THE DETECTION AND DETERMINATION OF SEVERALPOLLUTANTS - CO, SO(2), NO(X), H(2)S, PAH, NH(3),FORMALDEHYDE, PESTICIDES, ISOCYANATES, VINYL CHLORIDE,HYDRAZINES, NITROSOAMINES, ETC.

FEDRIP - VINYL CHLORIDE

THE FOLLOWING RECORDS ARE FROM THE CRISP SUBFILE, WHICH IS ALSO A SUBFILE IN TOXLINE. THESE CRISP RECORDS SHOULD DUPLICATE THE ONES YOU ALREADY HAVE FROM THE TOXLINE SEARCH.

4/7/2

1548721 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 5R01CA49529-02 AGENCY CODE: CRISP
Chloroacetaldehyde and ifosfamide toxicity (human,rats)
PRINCIPAL INVESTIGATOR: GOREN, MARSHALL P
ADDRESS: ST. JUDE CHILDREN'S RES. HOSP. 332 N. LAUDERDALE/POB 318 MEMPHIS, TN 38101
PERFORMING ORG.: ST. JUDE CHILDREN'S RESEARCH HOSPITAL, MEMPHIS, TENNESSEE
SPONSORING ORG.: NATIONAL CANCER INSTITUTE
FY : 90 FUNDS: $102,111 TYPE OF AWARD: Noncompeting Continuation (Type 5)
SUMMARY: Use of ifosfamide, an isomer of cylophosphamide with demonstrated activity against a spectrum of pediatric and adult tumors, has been limited by neurotoxic and nephrotoxic side effects. We have obtained preliminary evidence that chloroacetaldehyde, a metabolite of ifosfamide and of industrial toxins such as vinyl chloride, attains high concentrations in blood (5-50 mu M) and urine (100- 1000 mu M). This suggests that chloroacetaldehyde may be a causative factor in the development of the neurotoxicity and nephrotoxicity in patients being treated with ifosfamide, and may contribute to the bladder toxicity of both ifosfamide and cyclophosphamide. We propose to test this idea in rats and in childhood cancer patients who are receiving ifosfamide as part of their planned therapy. The long-range goal is to devise methods that will reduce the risk of adverse clinical effects associated with ifosfamide therapy. The immediate objectives are (1) to determine if and to what extent chloroacetaldehyde contributes to toxic effects on the central nervous system, kidney, and bladder; (2) to identify the risk factors that might lead to increased concentrations of chloroacetaldehyde in blood and urine (e.g., schedules of administration, effects of prior therapy, drug-drug interactions); and (3) to determine if mesna and N-acetyl-L- cysteine can remove chloroacetaldehyde from the urine and blood, respectively. The results of this work should allow us to identify clinical situations in which there is an increased risk of ifosfamide-induced toxicity and perhaps to find a pharmacologic basis for ameliorating such toxicity. Information from these studies will increase our understanding of the pharmacology and toxicity of chloroacetaldehyde in relationship to other anticancer agents and industrial toxins.

4/7/3

1542001 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 5P42ES04705-04 0005 AGENCY CODE: CRISP
Methods development--Exposure to benzene, styrene, and vinyl chloride (h
PRINCIPAL INVESTIGATOR: HAAS, ROBERT
ADDRESS: UNIVERSITY OF CALIFORNIA 322 WARREN HALL BERKELEY CA 94720
PERFORMING ORG.: UNIVERSITY OF CALIFORNIA BERKELEY, BERKELEY, CALIFORNIA
SPONSORING ORG.: NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

FY : 90 TYPE OF AWARD: Noncompeting Continuation (Type 5)
SUMMARY: NO SUBPROJECT ABSTRACT AVAILABLE. SEE PARENT GRANT.

4/7/4
1548449 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 5R01CA47234-03 AGENCY CODE: CRISP
Mechanisms of mutagenesis by cyclic DNA adducts (rabbits)
PRINCIPAL INVESTIGATOR: HUMAYUN, M ZAFRI
ADDRESS: NEW JERSEY MEDICAL SCHOOL 185 SOUTH ORANGE AVENUE NEWARK, N J 07103
PERFORMING ORG.: UNIVERSITY OF MEDICINE & DENTISTRY OF NJ, NEWARK, NEW JERSEY
SPONSORING ORG.: NATIONAL CANCER INSTITUTE
FY : 90 FUNDS: $122,740 TYPE OF AWARD: Noncompeting Continuation (Type 5)
SUMMARY: The major aim of this proposal is to investigate the mechanisms of mutagenesis by cyclic DNA adducts induced by metabolites of the carcinogen vinyl chloride. Our preliminary data imply that etheno-cytosine (sigma C) preferentially incorporates A residues in vivo leading to C-to-T transitions. Hydrated lesions are less mutagenic, but appear to have the same specificity. Our results point to two major categories of mechanisms for etheno adduct mutagenesis: a) Etheno lesions are essentially non-instructional.in vivo. Mutagenesis opposite these lesions arises due to 'non- specific' insertion by polymerase, possibly aided by stacking interactions expected of these planar lesions. Included in this category of mechanisms is the possibility that etheno derivatives are converted to abasic sites in vivo. b) Etheno derivatives have in vivo miscoding properties which are distinct from miscoding properties observed by others in vitro. In order to test the above and other mechanisms, we propose the following experiments. 1. The effect of genetic parameters on repair and mutagenesis: specifically, the effects of RecA, SOS and excision repair. This information is essential for a more complete interpretation of our present data. 2. Response of the above genetic parameters to hydrated etheno lesions. 3. Site-specific in vivo and in vitro experiments. The in vivo experiments will confirm present sigma C data by more exacting approaches, specifically test the mutagenicity of sigma A and will test a prediction in the literature that sigma A may cause 1 bp deletions. The in vitro site-specific experiments are aimed at a more detailed understanding of events associated with bypass of sigma C and Sigma A. In addition to the above experiments, a search for E. coli N- glycosylases capable of acting on etheno lesions will be mounted in later stages. We propose to develop and use sensitive immunoassays during the course of the above studies.

4/7/10
1548531 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 5R01CA47723-03 AGENCY CODE: CRISP
Biochemical mechanisms of vinyl chloride carcinogenesis
PRINCIPAL INVESTIGATOR: SINGER, BEA A
ADDRESS: LAWRENCE BERKELEY LABORATORY UNIVERSITY OF CALIFORNIA BERKELEY, CALIF 94720
PERFORMING ORG.: UNIVERSITY OF CALIF-LAWRENC BERKELEY LAB, BERKELEY, CALIFORNIA

SPONSORING ORG.: NATIONAL CANCER INSTITUTE
FY : 90 FUNDS: $281,371 TYPE OF AWARD: Noncompeting Continuation (Type 5)

SUMMARY: Over 3 billion kg/yr of vinyl chloride (VC) are produced in the U.S. VC has been amply documented as a human carcinogen associated with liver haemoangiosarcoma and tumors of the brain and lungs. No mechanism for its tumorigenicity has emerged, even though tumors are easily induced in rodents, and VC and its mutagenic metabolites, chloroethylene oxide (CEO) and chloroacetaldehyde (CAA) have been intensively studied. The known in vivo products of VC are three cyclic etheno bases, apparently derived from CAA; 7-(2-oxoethyl)G is apparently derived from CEO. Our long-term objective is to understand the molecular mechanism of initiation by VC, related carcinogens and their common metabolites.

This approach has three specific aims: (1) To use physical, chemical, and biochemical methods to study three known etheno products (1,N6-etheno A, 3, N4-etheno C, and N2,3-etheno G) of VC- nucleic acid reaction in terms of effect on polymer structure, replication and fidelity. Special emphasis will be placed on N2,3- etheno G which can form two hydrogen bonds with C or T. (2) To investigate the formation of additional derivatives by epoxides and aldehydes, including several biologically important simple mono- and bifunctional agents (e.g., ethylene oxide, cyanoethylene oxide, chloroacetaldehyde). (3) To study the initial chemical steps in formation of cyclic derivatives and crosslinks by the aldehyde and halide functions of the VC metabolites. Our purpose is to search for biologically significant chemical events that could be mutagenic or lethal.

The methods and approaches will utilize chemical synthesis of modified dNTPs, rNTPs, with and without radiolabel; kinetics and sequence of aldehyde/epoxide reactions; helix-coil transitions of polymers and oligomers containing modified etheno derivatives; optical methods (UV, IR, fluorescence); HPLC, gel electrophoresis, nucleotide sequencing; in vitro replication of defined oligomers; and utilization of etheno NTPs in site-directed mutagenesis.

4/7/13
1514346 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: Z01ES49002-01 AGENCY CODE: CRISP
Molecular epidemiology of cancer susceptibility and oncogene activation
PRINCIPAL INVESTIGATOR: TAYLOR, J
ADDRESS: NIEHS-NIH
SPONSORING ORG.: NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
FY : 90 TYPE OF AWARD: Not Applicable

SUMMARY: This is an expanded effort of Project Number Z01-ES-48003-02 EB. Studies in the branch have been established to investigate the role of proto- oncogene alleles in cancer susceptibility, and the role of oncogenes in carcinogen-induced human tumors. A case control study of bladder cancer has been initiated to investigate whether restriction fragment length polymorphisms of proto-oncogenes correlate with cancer susceptibility. Exposure information, along with blood, urine, and tumor tissue, are being collected on 200 bladder cancer cases and 200 controls. Southern blots will be used to determine whether rare alleles of H-ras and other proto-oncogenes correlate with cancer susceptibility. The interaction between genotype and exposure will also be explored.

To investigate the role of oncogenes in chemical carcinogenesis, fixed tissue blocks have been obtained from approximately 50 cases of benzidine or beta-napthylamine associated bladder cancer, and 100 bladder cancer cases without such exposures. In addition, a small number of cyclophosphamide associated bladder tumors have been obtained. The polymerase chain reaction (PCR) is being used to amplify H- K- and N-ras genes followed by oligonucleotide probing for oncogene activating mutations at codons 12 and 61. The pattern and mutational spectra of oncogene activation will be compared between benzidine/beta-napthylamine associated tumors, cyclophosphamide associated tumors and those which arose spontaneously or were smoking-associated.

In a similar study, fixed tissue samples of lung tumors will be obtained from individuals with primary lung cancers who had high dose occupational exposure to one of a variety of known lung carcinogens, including radon, asbestos, nickel, chromate, and vinyl chloride. PCR with oligonucleotide probing will be used to characterize ras family mutations which will then be correlated with exposure information.

4/7/14
1551213 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 5R01ES02759-09 AGENCY CODE: CRISP
Mechanisms of hepatotoxicity by environmental pollutants (rats)
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PERFORMING ORG.: UNIVERSITY OF NORTH CAROLINA CHAPEL HILL, CHAPEL HILL, NORTH CAROLINA
SPONSORING ORG.: NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
FY : 90 FUNDS: $204,952 TYPE OF AWARD: Noncompeting Continuation (Type 5)
SUMMARY: The major goal of this research is to delineate mechanisms whereby environmental pollutants produce hepatotoxicity. The model compounds, carbon tetrachloride and allyl alcohol, selective toxins for pericentral and periportal regions of the liver, respectively, will be studied to gain understanding of why the metabolism of hepatotoxic chemicals and their influence on cellular events differ in periportal and pericentral regions of the liver lobule. Employing isolated, perfused rat and mouse liver, the following experiments are proposed to define the acute action of hepatotoxins: (1) Determine the effect of the two model toxins on mixed-function oxidation, conjugation, ethanol metabolism and oxygen tension in periportal and pericentral regions of the liver lobule employing a micro-light guide to detect fluorescent products or mini-electrodes to measure oxygen; (2) determine enzyme activities and key metabolites in periportal and pericentral zones by quantitative histochemistry; (3) examine tissue damage by light and electron microscopy. Throughout these studies, the nutritional state will be manipulated either by dietary means of the experimental animal or by the infusion of appropriate carbohydrates to the perfused liver. Methods will be developed to measure rates of CCl4, aflatoxin and allyl alcohol metabolism, glutathione-S-conjugation and to monitor Ca++ concentrations in periportal and pericentral regions of the liver lobule. In other studies, temporal changes in the above parameters following chronic, low-dose exposure of rats and mice to allyl alcohol and

CCl4 will be investigated. To avoid the use of metabolic inhibitors, recombinant inbred lines of mice will be employed to establish causal relationships between biologic factors and hepatotoxicity. Knowledge gained in these studies will then be applied to other hepatotoxins including pesticides, vinyl chloride, styrene, benzene and toluene. Knowledge of metabolic factors involved in mechanisms of hepatotoxicity in intact cells may ultimately be applied to reducing the hazard of hepatotoxicity by environmental pollutants.

4/7/16
1559587 DIALOG FILE NO. 265/266 FEDERAL RESEARCH IN PROGRESS
IDENTIFYING NO.: 5R01OH02663-02 AGENCY CODE: CRISP
Selective real-time detection of olefin gases and vapors
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PERFORMING ORG.: UNIVERSITY OF MICHIGAN AT ANN ARBOR, ANN ARBOR, MICHIGAN
SPONSORING ORG.: NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
FY : 90 FUNDS: $87,444 TYPE OF AWARD: Noncompeting Continuation (Type 5)

SUMMARY: Currently available personal direct-reading instruments for organic gases and vapors are limited by the poor selectivity of the sensing components employed. Determination of the concentrations of individual components of even simple mixtures is generally not possible. Thus, there is a need for improvements in sensor technology for industrial hygiene monitoring applications. The development of highly selective chemical microsensors and associated microinstrumentation would greatly improve our ability to characterize and control occupational exposures to toxic chemicals.

We propose to develop a compact prototype instrument that utilizes a coated surface-acoustic-wave (SAW) chemical microsensor to achieve selective, real-time measurement of each of the following olefin gases and vapors: acrylonitrile, butadiene, beta-chloroprene, ethylacrylate, styrene, vinyl chloride, and vinylidene chloride. These target olefins were chosen due to their potential carcinogenic, neurotoxic, and/or adverse-reproductive health effects. Selectivity for a given target olefin will be achieved by coating the surface of the SAW device with one of several organoplatinum reagents designed to react specifically with that olefin. Preliminary studies have shown that subtle changes of the ligands in the reagent result in selective reactivity toward certain olefins in the presence of other olefin and non-olefin co-contaminants. Furthermore, following exhaustive exposure the original trapping reagent can be regenerated, in situ, by simple chemical treatment, permitting repeated use of the sensor.

A dual 97-MHz SAW.device having an integrated surface heating element and an overall area of 0.8 cm2 will be fabricated in our laboratory. The prototype instrument will be constructed from a single-board computer, modified to accomodat the SAW microsensor and the associated circuitry. The instrument will be equipped with data-storage and digital-readout capabilities for both real-time and timeweighted-average measurements. Instrument performance will be evaluated using dynamic test atmospheres with respect to several relevant operating parameters.