This is an excerpt from

Army Research Office
Broad Agency Announcement
W911NF-04-R-0005
April 2004 – FY2006

Documents of this kind are ***always*** subject to revision. For this reason, before preparing and submitting a proposal, ***always*** confirm that your source document is still current and make certain to obtain any subsequent modifications or appendices. Upon request, our office would be pleased to help you in this regard.

Tom Murphy
Office of Intellectual Property & Sponsored Research
Brookhaven National Laboratory
Extension 3312
E-mail: tmurphy@bnl.gov

scenarios and systems, the performance of image [redacted]s systems is limited by the algorithms, signal processing strategies and models, rather than the sensors or p[redacted]rs. Even though there has been a large investment in automatic target recognition algorithms, significa[redacted]comings exist, leading to the need for a renewed emphasis on the theoretical underpinnings. To this end, the [redacted]n is interested in innovative research which addresses the following objectives: (i) development of a set of s[redacted]ic metrics which quantify image content, image complexity, and the performance of image recognition and cla[redacted]ion techniques, (ii) development of metrics for structured and target-like clutter, (iii) development of metric[redacted]sessing and validating synthetic scenes. The ultimate goal is to develop image science to the point that the pe[redacted]nce of automatic target recognition systems in arbitrary real-world scenarios can be predicted. The empha[redacted]e Image Science program is on the underlying issues of information science and image analysis. Other Al[redacted]grams are concerned with the development of the detectors and algorithms themselves.

Technical Point of Contact: Dr. Richard Hammon[redacted]ail: Richard.Hammond@us.army.mil, (919) 549-4313.

RESEARCH AREA 7
CHEMISTRY

7.0. Chemistry is central to the operation of the Army Research Office. Explosives, propellants, fuel cells, and batteries function by converting chemical energy into mechanical and electrical energy. Macromolecules, especially elastomers, provide materials for equipment. Protection of the soldier against chemical agents requires the detection, identification, and destruction of such chemicals, and the design and construction of barriers to their passage. The destruction of toxic wastes represents another chemical problem faced in the restoration of military real estate and the safe demilitarization of surplus munitions. We invite proposals for research to advance our understanding of chemical materials and processes with a strong prospect for use in future Army technology.

Potential offerors are encouraged to contact the appropriate Technical Point of Contact (TPOC) for preliminary discussions on their ideas. The TPOC may invite the offeror to submit a preproposal.

7.1. Chemical Kinetics. The Army's program in ignition and combustion processes associated with energetic materials, explosives, detonation phenomena, the control of energy release and energy transfer processes will benefit from increase understanding of fast reactions of energetic species. We are especially interested in the investigation of chemical reactions using time-resolved techniques to observe transient species and infer reaction pathways and other experiments and calculations that enable modeling of the time dependent processes of ignition and combustion. Research on controlled transformation of toxic materials to relatively benign products in chemical reactors is also of interest.

Technical Point of Contact: Dr. Robert Shaw, e-mail: Robert.Shaw@us.army.mil, (919)-549-4293.

7.2. Electrochemistry and Advanced Energy Conversion. The Army relies on compact power sources to support many different weapons systems, communications, and other devices. Power sources under development include batteries and fuel cells, microturbines, thermophotovoltaics, alkali metal thermal to electric converters. This program supports fundamental chemical studies of materials and processes that limit the performance of current or enable future power sources. Topics include ionic conduction in electrolytes, electro catalysis, fuel processing (particularly hydrogen), interfacial electron transfer, transport through coatings, surface films and polymer electrolytes, and activation of carbon-hydrogen bonds. Novel electrochemical synthesis, investigations into the effect of microenvironment on chemical reactivity, and quantitative models of electrochemical systems are also encouraged.

Technical Point of Contact: Dr. Richard Paur, e-mail: Richard.Paur@us.army.mil, (919) 549-4208.

7.3. Organic Chemistry and Organized Media. There exists a need for basic research in detection of toxic materials, decontamination of those materials, and protection of the soldier during those processes. This program seeks to explore fundamental research addressed at eliminating toxic materials in processing and protect the soldier from

existing toxic materials. New, more efficient, and environmentally benign organic reactions, both stoichiometric and catalytic, are of interest, especially nitration and oxidative and nucleophilic displacements at phosphorus and sulfur for destruction of toxic organic compounds. Selected mechanistic studies that promise new insights to the pathways of the above reactions are encouraged, as are new synthetic pathways with reduced production of waste by-products.

Technical Point of Contact: Dr. Stephen Lee, e-mail: Stephen.Lee2@us.army.mil, (919) 549-4365.

7.4. Polymer Chemistry. The Polymer Chemistry Program seeks novel, fundamental polymer research that may lead to new materials that provide the soldier with critical protection and required materiel. Research of interest may be related to chemical and biological agent protective materials, ballistic protection, transparent materials for eye protection and sensors, including laser protection, materials that have tunable optical properties, and lightweight super-strong materials. Research areas of interest that may be relevant include synthesis of polymers, including polymers with novel architectures and compositions, new approaches to synthesizing polymers, organic/inorganic hybrid polymeric materials, creating light-weight polymeric materials with enhanced strength, and the design and synthesis of environmentally benign polymeric materials that may benefit the soldier. Also of potential interest is characterization of structure/property relationships, diffusion and transport, and fiber properties related to polymer chemistry.

Technical Point of Contact: Dr. Douglas Kiserow, e-mail: Douglas.Kiserow@.us.army.mil, (919) 549-4213.

7.5. Surfaces and Catalysis. This program supports fundamental research on the decomposition and interaction of molecules on well-characterized surfaces, and catalysts. The development of new experimental probes of these reactions is also of interest. The most important species are organo-phosphorus, -sulfur, and -nitrogen molecules, and reactions of organic functional groups on surfaces and catalysts. Research areas of interests include nanoparticle reactivity, the interface between nanostructures and biomolecules, the reaction mechanisms of hazardous materials with plasmas, and the fate of toxic materials on surfaces in the environment.

Technical Point of Contact: Dr. Stephen Lee, e-mail: stephen.lee2@us.army.mil, (919) 549-4365.

7.6. Theoretical Chemistry. Army requirements for insensitive munitions, for propellants and explosives with greater energy density, for the control of propellant burning rates, and controlled energy release from explosives provide a continuing interest in a variety of theoretical explorations. Theoretical investigations may provide predictive capabilities relevant to the properties and behavior of a wide spectrum of energetic materials and their prototypes. Specific exramples are studies of energy transfer mechanisms in condensed phases, the prediction of molecular reactivities, the investigation of heterogeneous reactions, and the prediction of reaction pathways. Theoretical understanding of atoms, molecules, and clusters on surfaces may provide the basis for rational design of catalysts.

Technical Point of Contact: Dr. Robert Shaw, Robert.Shaw@us.army.mil, (919)-549-4293.

RESEARCH AREA 8
LIFE SCIENCES

8.0. Extramural research in the Life Sciences is supported by the Army Research Office. For those proposals related to purely medical topics, the investigator is invited to contact the U.S. Army Medical Research and Materiel Command. For research in the behavioral and social sciences or in training techniques, contact the Army Research Institute for Behavioral and Social Sciences. The ARO Life Sciences Division research program is currently focused on four sub area work packages. The titles, scopes and points of contact for these work packages, each of which address general aspects of basic research in biotechnology, as well as the specific thrusts described, are listed below. A small number of symposia, conferences and workshops are also supported in part or in whole to provide an exchange of ideas related to ongoing programs in Army laboratories.