



## **CORROSION PROCESSES, CONTROL, MITIGATION, AND TECHNOLOGY**

The Naval Research Laboratory (NRL) is interested in receiving proposals for research and development in materials performance, environmental effects, corrosion processes, corrosion control and marine coatings technology. These efforts may include studies from basic corrosion mechanistic studies through applied technology and corrosion control initiatives. The areas of research and development activities of interest to NRL include, but are not limited to the following:

- 1) Develop computational modeling techniques for the development of predictive equations of state for materials, mechanistic prediction and prognostics, which could greatly reduce costs, techniques, methodology and processes for developing new materials with improved corrosion resistance and structural performance attributes. These may include fundamental composition modification, forming processes, treatments, processing and augmentation that permit optimization of properties, including corrosion resistance, cathodic protection requirements, reduction in localized effects, stress corrosion cracking resistance, reduced hydrogen embrittlement, etc.
- 2) Improved properties of materials, inhibitors, surface modification and passivation, property enhancement related to materials physical property improvements, improved galvanic compatibility, minimize microbial influenced corrosion (MIC), electrochemical enhancement, plating, hardening, carburization and low temperature carburization, surface coatings, welding techniques, annealing, reduced susceptibility to stress corrosion cracking and hydrogen effects, novel methods for metal extraction, ionic liquids, rapid prototyping methods, oxidation/reduction effects. Materials efforts may contribute toward Navy vessels and may include but are not limited to: steels, HSLA steels, stainless steels, nickel alloys, aluminum alloys, titanium, copper/bronze, magnesium alloys, composites, polymers, anode materials, and novel materials, such as nano-based, amorphous, implanted, flame/plasma spray, novel microstructure and unique technology.
- 3) Design of marine coatings technology that contribute to improved corrosion performance, new resin/formulation properties, coatings durability, reduced total life cycle cost, dual-use, improved inspection capability, reduced/marginal surface preparation requirements, advanced application technology, rapid cure/single coat cure, self inspecting, radar adsorption, acoustic damping, improved special hull treatment/mold in place, antifoulant technology, cavitation/erosion resistance, reduced maintenance and condition based

maintenance (CBM). These efforts may pertain to all ship and submarine platform technologies and includes applications for aircraft, remotely operated vehicles, autonomous vehicles, Marine Corps vehicles, component parts and developing technology.

4) Development of: sensor technology, corrosion control systems, cathodic protection technology, electrochemical techniques, integrated components, biological materials, novel electronic circuits, smart materials and structures, dual-use systems, control algorithms, computational techniques, physical scale modeling, devices, components, bioremediation techniques, chlorination/dechlorination methods/equipment, descaling/fouling removal applications, electrical isolation, improved grounding, power systems, fuel cell technology, catalysts, membrane technology, materials extraction, novel manufacturing processes – including interstitial hardening and other surface modification processes that improve the corrosion resistance of materials, diamond materials, surface enhancements/detection methods, improved concrete processes/durability, and diver safety technology.

5) Development of materials, coatings, devices, components, product and systems that address crucial Naval and DoD requirements for corrosion prevention, control, remediation, maintenance, life-cycle extension, cost reduction, platform sustainment, sea basing, technical insertion, advanced ship design, propulsion systems, equipment design/specification, system engineering and unique naval applications.

Address White Papers (WP) to [6130BAA@nrl.navy.mil](mailto:6130BAA@nrl.navy.mil). Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.