



TOPIC CANCELED 5/1/10

SUPERCONDUCTING MATERIALS

The Naval Research Laboratory (NRL) is interested in basic research and exploratory development of superconducting materials, devices, components and systems that address crucial Naval and DoD requirements. Although the principal area of interest is in superconductors with transition temperatures in excess of 30K, unusually sound proposals for research and development of devices, components and circuits fabricated from materials with superconducting transition temperatures below 30K will be considered for funding if deemed suitable for potential Naval applications. The areas of research and development activities of interest to NRL include:

- 1) Innovative ultra-sensitive electromagnetic sensors and sensor arrays which respond to frequencies from dc through the microwave and millimeter wave regions of the spectrum through the infrared, the visible and into the ultraviolet region of the spectrum with particular emphasis on applications in the areas of Magnetic Anomaly Detection (MAD), mine countermeasures, corrosion detection and Non-Destructive Evaluation (NDE) of materials.
- 2) Innovative low loss, wide band passive microwave and millimeter wave devices and components as well as ultra-low noise mixers, detectors, and amplifiers.
- 3) Innovative electrically short, and super-directive antennas from the ELF through the millimeter wave regions of the spectrum.
- 4) Innovative ultra-high throughput, very low power dissipation digital data and signal processing devices and circuits (including analog-to-digital and digital-to-analog converters).
- 5) Very low loss, zero frequency-dispersion signal transmission lines.
- 6) Very low noise, wide bandwidth superconducting amplifiers from dc through the millimeter wave spectral band.
- 7) High temperature superconducting conductors suitable for applications involving high field magnets and solenoids and for current leads for such systems.
- 8) Novel design concepts for high temperature magnets operating at temperatures over 20K and producing magnetic fields over 2 Tesla.
- 9) Novel and innovative concepts for the use of High Temperature Superconducting (HTS) magnet systems such as, but not limited to, electrical motors and generators, magnetic mine sweeping, magnetic separation of ores, magnetic energy storage, or power conditioning.

- 10) Preparation of high quality and high temperature superconductors and the search and development of new superconducting materials.
- 11) Techniques for the measurement of the electrical, mechanical, optical and thermal properties of superconducting materials, devices and components.
- 12) Innovative cryogenic refrigeration techniques, systems, and cryogenic packaging techniques suitable for use with superconducting and cold electronic devices and circuits.
- 13) Innovative RF communication networks linking advanced, multiple sensors and an advanced receiver system are sought that utilize new and emerging micro-electronics packaging technologies, advanced receiver technologies, improved sensor technology, and emerging signal processing techniques.
- 14) Innovative methods to cool high-density electronic systems which perform a wide variety of functions, while at the same time offer reduced system volume and weight. Either a room temperature or cryogenic liquid may be proposed.

Projects ranging from short duration to several man-years will be considered.

Address White Papers (WP) to NRL Program Office (Code 6300), [e-mail](#), telephone (202) 767-2926 or FAX (202) 404-8009. 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.