SOCOM213-005: Micro Raman Technology

MODERNIZATION PRIORITIES:

5G, General Warfighting Requirements (GWR), Microelectronics

TECHNOLOGY AREA(S):

Chem Bio Defense, Electronics, Sensors

OBJECTIVE:

The objective of this topic is to develop applied research toward an innovative micro Raman capability through the creation of an inexpensive, spectroscopic technique which relies upon inelastic scattering of photons to provide the SOF Operators low-visibility scientific grade cellular phone or ATAC based attachment for quick stand-off identification of chemicals; bringing laboratory grade science to the tactical edge.The objective of this topic is to develop applied research toward an innovative micro Raman capability through the creation of an inexpensive, spectroscopic technique which relies upon inelastic scattering of photons to provide the SOF Operators low-visibility scientific grade cellular phone or ATAC based attachment for quick stand-off identification of chemicals; bringing laboratory grade science to the tactical edge.

ITAR:

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

DESCRIPTION:

As a part of this feasibility study, the proposers shall address all viable overall system design options with respective specifications on an orthogonal handheld Raman chemical, automated colorimetric identification system that is embedded on a cellular phone or ATAC platform

PHASE I:

Conduct a feasibility study to assess what is in the art of the possible that satisfies the requirements specified in the above paragraphs entitled "Objective" and "Description."

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study ("Technology Readiness Level 3") to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II:

Develop, install, and demonstrate a prototype system determined to be the most feasible solution during the Phase I feasibility study on the micro Raman technology.

PHASE III DUAL USE APPLICATIONS:

: This system could be used in a broad range of military applications where non-destructive chemical analysis technique are employed to provide detailed information about chemical structure, phase and polymorphy,

crystallinity and molecular interactions. Typical examples of commercial employment of Raman technology include:

- Art and archaeology - characterization of pigments, ceramics and gemstones;
- Carbon materials - structure and purity of nano-tubes, defect/disorder characterization.
- Chemistry - structure, purity, and reaction monitoring;
- Geology - mineral identification and distribution, fluid inclusions and phase transitions;
- Life sciences - single cells and tissue, drug interactions, disease diagnosis;
- Pharmaceutics - content uniformity and component distribution;
- Semiconductors - purity, alloy composition, intrinsic stress/strain microscope.

REFERENCES:

1) Jehlicka, Jan, Adam Culka, Lily Mana, and Aharon Oren. 201 Comparison of Miniaturized Raman Spectrometers for Discrimination of Carotenoids of Halophilic Microorganisms. May 2 Accessed June 30, 202 https://doi.org/10.3389/fmicb.2019.01155.

KEYWORDS:

raman; ATAC; colorimetric; spectroscopic; inelastic scattering; chemical analysis; microelectronics; forensics; chemistry; sensitive site; sensitive site exploitation; micro raman; raman technology; micro-raman technology

TPOC USERS:

TPOC-1: SOCOM SBIR
PHONE: N/A
EMAIL: sbir@socom.mil