

## **S<sup>2</sup>MARTS “Coming Soon” Opportunity (22-13)**

### **Co-Packaged Analog-Drive High-Bandwidth Optical Input/Output (KANAGAWA)**

The Office of the Undersecretary of Defense, Research & Engineering (OUSD(R&E)) Trusted & Assured Microelectronics (T&AM) program is seeking to mature co-packaged optics (CPO), laser sources, and associated advanced packaging techniques for prototype demonstration and technology transition into the DoD advanced packaging ecosystem and the Defense Industrial Base (DIB).

While the merits of co-packaged optical I/O have been well known for two decades, the technology is nascent and requires substantial maturation prior to adoption in DoD programs of record. Additionally, the manufacturing processes and supply chain for the photonic chips that comprise co-packaged optical modules is not well established, and demonstrations to date have relied on expensive, custom assembly that are not compatible with high-volume production.

The purpose of this effort is to design, build, and test prototypes which demonstrate analog-drive CPO, laser sources, and heterogeneous integration techniques with other electrical ICs (e.g., FPGAs, data converters). The first task engages optical I/O designers to mature and demonstrate the optical I/O device and laser. Key performance parameters for the analog-drive optical input/output (I/O) device include a bandwidth exceeding 2 Tbps and energy losses below 5pJ/bit (including laser contribution). Maturation will be systematically tracked by tailoring metrics from the DoD Manufacturing Readiness Level (MRL) Deskbook 2020.

([http://www.dodmrl.com/Interactive MRL Users Guide 2020 Version.xlsm](http://www.dodmrl.com/Interactive_MRL_Users_Guide_2020_Version.xlsm)). The second task engages domestic packaging facilities to assess and demonstrate the manufacturing of Multi-Chip Packages (MCPs) which incorporate the optical I/O and laser technologies and target technology transition into the DIB. Summarily, KANAGAWA will accelerate the transition of CPO I/O technology into DIB MCPs, while driving affordability and scalability for production.

The KANAGAWA Other Transaction Authority (OTA) prototype project is anticipated to be executed within a 40-month period.