

An Introduction to MOSIS 2.0 and the California Defense Ready Electronics and Microdevices Superhub (DREAMS)

Rehan Kapadia

Ming Hsieh Department of Electrical and Computer Engineering
University of Southern California

The University of Southern California Information Sciences Institute (USC/ISI) leads the Defense Ready Electronics and Microsystems Superhub (DREAMS), one of eight regional innovation hubs established under the Department of Defense Microelectronics Commons Program. This initiative is funded by the CHIPS and Sciences Act of 2022 with the objective of developing onshore microelectronics hardware prototyping capabilities.

DREAMS brings together academic and commercial organizations across Southern California and national partners with three primary objectives: the maturation of advanced RF technologies for rapid prototyping, the transition of semiconductor technologies from laboratory to fabrication, and the training of the next generation of engineers in advanced RF and microelectronics technologies.

At the core of DREAMS is the USC/ISI MOSIS Multi Project Wafer (MPW) fabrication service. For over 40 years, MOSIS has facilitated the end-to-end prototyping of microchips for educational, commercial, and national security applications. MOSIS has historically provided accessible silicon technologies to academia, industry, and government, supporting over 50 U.S. government laboratories and agencies, more than 800 colleges and universities, and over 100 companies. It has trained thousands of microelectronic design engineers and supported the fabless semiconductor model. MOSIS 2.0, the latest iteration, connects customers to a comprehensive network of nanofabrication and foundry services, enhancing the application of advanced process and prototyping technologies within the DREAMS hub and reducing barriers to innovation.

MOSIS 2.0 functions as a central gateway for users to access end-to-end prototyping services, reducing innovation barriers. It features a secure data and analytics architecture supporting EDA tools, a manufacturability analytics platform, and connectivity to government and curated intellectual property (IP). A critical focus of MOSIS 2.0 is scaling advanced process and prototyping technologies within the superhub for transition to high-volume production, utilizing uniform process control and evaluation methods. Critically, MOSIS 2.0 integrates seven major academic nanofabrication facilities in the Southern California area and three major DOD-volume fabrication facilities to accelerate lab-to-fab transitions and offers prototyping services beyond traditional MPW runs. We will discuss different modes of interaction with MOSIS 2.0, highlighting how faculty, startups, government, and established companies can benefit and accelerate the pipeline from innovation to production.