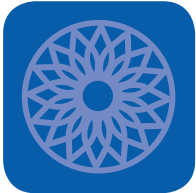


# INTRODUCTION



Welcome to the 2005 MTL Annual Report. This report contains research abstracts from faculty and senior research staff whom are associated with the MTL. The work spans a broad range of topics from Circuits and Integrated Systems to Molecular and Nanotechnology. These investigators come from more than 30 different departments, labs, and centers across the Institute.

This year, the Annual Report format and appearance has been changed to provide a more effective means of communicating the various activities in and around MTL. In particular, we have adhered to a strict one-page format for the Annual Report abstracts which are intended to give the reader a high level view of the project, and provide information on where to find more detailed information. This report is also available on the MTL web site at <http://mtlweb.mit.edu>, which includes links to more detailed content.

The MTL Mission states that we are an Interdepartmental Laboratory that encompasses research and education with an intellectual core of i) Semiconductor Process and Device Technology, and ii) Integrated Circuits and Systems Design. MTL fosters new initiatives in Microsystems at the Institute. MTL provides Microsystems infrastructure to the Institute.

Organizationally, MTL supports this mission by focusing on two major goals; maintaining and supporting a core research community which is aligned with our research mission, and managing a set of shared experimental facilities which support of the core research community as well as the broader campus community. In addition, MTL maintains a strong relationship to industry through a portfolio of relationship options.

The core research community is comprised of approximately 20 faculty and senior research staff that do research in areas of integrated circuits and systems, nanoelectronics, photonics, MEMS, and molecular and nanotechnology. These faculty are closely aligned to the industries which commercialize this research. The community is maintained through a collection of activities including seminars, committees and an annual research conference attended by approximately 150 persons.

The shared experimental facilities are comprised of three different clean-rooms which support micro and nano fabrication technologies from advanced silicon processing, to a diverse range of materials. These three facilities are centrally managed by a professional staff of 16 engineers and technicians. In addition to the fabrication facilities, the MTL also maintains computer infrastructure for CAD as well as testing equipment. More details on the facilities are provided later in this report as well as on the MTL web site.

MTL has a portfolio of industrial engagements from major alliances to individual research grants. The flagship relationship is the Microsystems Industrial Group (MIG) which is a consortium relationship which provides members with priority access to the students and research output of the lab. In addition, four industrial research centers with more focused interests are associated with the MTL; Center for Integrated Circuits and Systems (CICS), Intelligent Transportation Research Center (ITRC), MEMS@MIT, and the Center for Integrated Photonic Systems (CIPS).