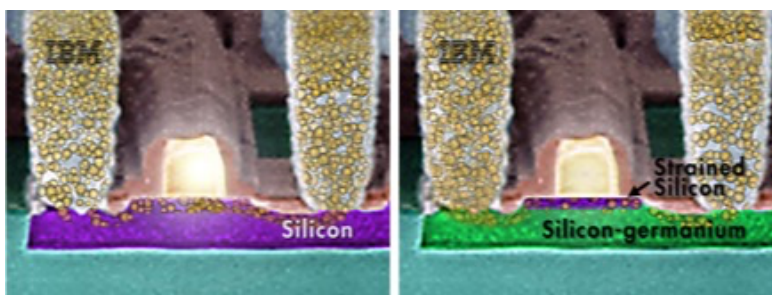


**Course Announcement: Fall 2024**  
**Materials Issues in Electronics**  
**MSE 502**

Electronic materials have revolutionized our modern world, changing the way we communicate and transforming our everyday lives. The continuing miniaturization of semiconductor chips with ever-increasing functionality is driven by materials insights and discoveries. For example, heteroepitaxy, uniaxial strain, oxidation, and diffusion have enabled significant improvements in the energy-efficiency of transistors. Looking to the future, emerging two-dimensional materials may provide novel quantum states for faster and more efficient information processing. Indeed, the exponentially growing societal demand for computation places the future of technological innovation on the hardware side where materials solutions are essential.



This course will focus on the key materials issues relevant to the conversion of a material into an electronic device. We will begin with a review of the physics of semiconductors and semiconductor devices, and those defects that either enhance or limit the performance of those devices. Next, structural, chemical, electrical, and optical characterization will be discussed. The remainder of the course will focus on specific materials issues relevant to the steps involved in the conversion of a material to a device. The potential role of emerging materials will also be addressed.

The course is intended for seniors and graduate students with an interest in materials issues in electronics. The pre-requisite is undergraduate physics, including some introductory quantum mechanics.

**Instructor:** Prof. Rachel S. Goldman, [rsgold@umich.edu](mailto:rsgold@umich.edu)

**Credit:** 3 credits

**Meeting Time:** T/Th 9:00-10:20 am

**Meeting Place:** Room 1690 Beyster

**Course Materials:**

*We will utilize supplemental reading assignments from textbooks on reserve and recent literature reports.*