2:30PM J3.00001 Nanofabrication in the Magnetic Recording Industry: Past, Present and Future
RICARDO RUIZ, HGST, a Western Digital Company — The magnetic recording industry stands out as an example of multidisciplinary nanotechnology that keeps pushing the envelope in terms of controlling matter and events at the nanometer length scale. From magnetic media composed of sub-10 nm grains, to overcoat protecting layers that are only 2-3 nm thick, to read sensors that are ~30 nm wide, to recording heads that fly at ~5 nm heights with speeds up to 100 mi/hr, nanotechnology and nanofabrication have been inseparable to the success and extendibility of hard disk drives. Looking into the future, as the demand for data storage continues to increase in a data-centric, cloud-connected environment, future magnetic recording will need to scale accordingly to accommodate ever increasing demands for areal density gains. Future storage technologies such as heat assisted magnetic recording that employs plasmonic antennas or magnetic bit patterned media that requires self-assembly of block copolymers, also stake their success in the advances of nanoscience. I will review research opportunities in this industry with a personal perspective of a decade’s worth in self-assembly for lithographic applications.

3:06PM J3.00002 From silicon nanowire sensors to making living safer
MONIKA WEBER, Yale University

3:42PM J3.00003 Control of crystal morphology and orientation in nano-confined semi-crystalline polymer films to obtain superior barrier performance
BERNARD OBI, The Dow Chemical Company — Several global megatrends are driving the need for packaging films that offer much more superior barrier to oxygen and water vapor transmission than have been traditionally achieved, whilst maintaining high levels of transparency. For food packaging applications targeting aluminum foil barrier performance, OTR and WVTR of approximately $10^{-2}$ cc/m$^2$-day-atm are typically required. The U.S. flexible packaging market was predicted to exceed $26.5$ billion by 2010 with an annual growth rate of over 67 wt %. We have worked at understanding the parameters that control the transmission of small penetrant molecules through these thin transparent polymeric flexible barrier films, and how to design for high barrier performance. The dispersion of large aspect ratio impervious inclusions in an In-plane oriented morphology into these films lead to very high tortuosity and correspondingly very high barrier performance. A physical model that describes mechanistically the spatial control of crystallization kinetics in a nano-confined geometry using micro-layer technology to obtain predominantly “In-plane” lamellae orientation in semi-crystalline barrier polymer films was validated for providing up to 200X improvement in barrier performance.

4:18PM J3.00004 Integrated Ge laser for silicon photonics platform
RODOLFO CAMACHO, Intel Corporation — The exponential increase of data transfers and requirements have produced difficult constrains that silicon photonics is posed to solved. The integrated platform of silicon photonics. In this ecosystem one of the main barriers is the fabrication of integrated transceivers, which translates into lasers on Si. A material proposed is germanium. Growth techniques, laser design and theory are demonstrated concluding in the creation of a 0.2% biaxial strain and highly n-type doped Ge laser exhibiting gain > 1000 cm$^{-1}$.