Beyond the Rayleigh Limit in Optical Lithography

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In optical lithography, the feature size in which scientists can write the circuits is limited to half the wavelength of the light by something called the diffraction limit. Many attempts have been made to advance this field beyond the current limit set by the wavelength of the laser used. In this talk, I shall review these methods and then present a method for optical sub-wavelength lithography that is only a single preparation step away from the currently implemented lithographic process. This method allows, in principle, to write a pattern with an accuracy better than a millionth of the wavelength of the light used.

M. Suhail Zubairy is a University Distinguished Professor of Physics and the holder of the Munnerlyn-Heep Chair in Quantum Optics at the Texas A&M University. He received his Ph.D. from the University of Rochester in 1978. He served as Professor of Electronics and the founding Chairman of the Department of Electronics at the Quaid-i-Azam University before joining Texas A&M University in 2000. Prof. Zubairy’s research interests include quantum optics and laser physics. He has published over 300 research papers on topics such as precision microscopy and lithography, quantum computing, noise-free amplification, and atomic coherence effects. He is the co-author of two books, one on Quantum Optics and the other on Quantum Computing Devices. He has received many honors including the Willis E. Lamb Award for Laser Science and Quantum Optics, Alexander von Humbold Research Prize, the Outstanding Physicist Award from the Organization of Islamic Countries, the Abdus Salam Prize in Physics, the International Khwarizmi Award from the President of Iran, the Orders of Hilal-e-Imtiaz and Sitara-e-Imtiaz from the President of Pakistan, and the George H. W. Bush Award for Excellence in International Research. He is an elected member of the Pakistan Academy of Sciences and a Fellow of the American Physical Society and the Optical Society.

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