Moore for Less: Lithography for the 15nm Node and Beyond

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Lithography has, and will continue to be the engine that drives Moore's Law. The pursuit of ever smaller feature sizes while preserving fidelity and process window has occupied the attention and talent of lithographers around the world for several decades. Although the demise of optical lithography has often been predicted to be imminent, numerous advances and innovations on both the equipment and photoresist fronts as well as changes in process architecture and design techniques have enabled optical lithography to persist and even flourish as the dominant photolithographic technique in use today with illumination wavelengths steadily decreasing along with an increase in the numerical aperture (NA) of the exposure tools.

However, further incremental reductions in wavelength or increase in NA are not possible. The industry is now facing the prospect of process innovation to continue the use of 193nm ArF lithography or switch to Extreme Ultraviolet (EUV) lithography at 13.5nm. Both approaches have their advantages and their challenges and are the subject of considerable research and development at this time. The challenges are both hardware and material-related and it is clear that considerable progress needs to be made on both fronts to ensure the continuation of Moore's Law scaling. In this talk, the status and future of lithography will be discussed and the key challenges of both approaches will be analyzed.