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Experimental Validation of Full-field Extreme Ultraviolet Lithography Flare and Shadowing Corrections

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Extreme Ultraviolet Lithography (EUVL) is the leading candidate for 22nm half-pitch device manufacturing. IMEC has a fully-integrated 300mm EUVL process line investigating issues related to the introduction of EUV technology in high-volume manufacturing. In this study we discuss our current approach for flare mitigation and shadowing correction. We demonstrate that it is indeed possible to implement an effective flare mitigation strategy for EUVL, and we compare advantages and limitations of rule-based and model-based strategies. We discuss CD re-sizing at mask level, the experimental creation of rule sets, as well as numerical issue related to high resolution flare map generation. With respect to shadowing, we detail an approach to compensate for pattern placement error and bias, and we validate shadowing compensation through tool set up (overlay) and design stretching (bias). Finally, we characterize experimentally the impact of flare and shadowing on the EUV ADT performance, and the efficacy of our mitigation strategies.

Keywords: EUV lithography, EUV resists, EUV reticle, full field imaging, shadowing, flare