Quantitative Description of Ion Implantation Profile Based on Pearson Distribution

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Abstract Content:

Ion implantation is a critical process in semiconductor manufacturing, where precise control over dopant profiles is essential for achieving desired device performance. However, implantation profile varies with many factors, such as substrate crystalline and its orientation, implantation conditions like energy, incident angle and divergent angle etc. Commonly used Gaussian profile may deviate from the real implantation profile. This study introduces Pearson distribution to quantitatively describe ion implantation profiles. We validated this approach with several typical ion implant profiles. Moreover, we applied the approach to successfully identify the root causes of implanter failures, such as energy and angle shifts, which can adversely impact implantation precision. This methodology provides an accurate tool matching and accurate TCAD simulation, enhancing process reliability and device yield in advanced semiconductor design and fabrication.

Reference:

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