

ACCELERATORS AND ION BEAMS FOR QUANTUM TECHNOLOGIES

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Ion implantation is a key technology that has been successfully employed for decades in the semiconductor industry. For example, it is the method of choice for creating p and n type silicon, or the manufacture of silicon on insulator (SOI) wafers using the SIMOX process. We are now in the midst of the second quantum revolution where ion implantation continues to play a pivotal role in the development of the new quantum technologies such as quantum computers and quantum sensing devices. With the advent of these new quantum technologies, new scientific and engineering challenges have arisen that require unprecedented control over the position and fluence of the ion implantation process. The new generation of accelerators and ion implanters that are being developed for deterministic ion implantation require control over single ions with spatial and depth precision at the nanometre scale. In this presentation the current progress in the development of accelerators and ion implanters for deterministic ion implantation will be reviewed. In addition, applications and challenges associated with the generation of q-bits and colour centres using ion implantation will be explored.