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(I) Plasma Immersion Ion Implantation: Physics & Applications

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Many materials science applications require high fluence ion implantation. Plasma Immersion Ion Implantation (PIII) is a technique in which the target to be implanted is immersed in the plasma, and implanted using negative-polarity high-voltage pulses. PIII has many applications including advanced semiconductor processing [1], photonic devices [2-3], ion implantation of advanced materials such as graphene [4], corrosion inhibition of metals [5], and most recently, studies of ion bombardment of plasma-facing components for plasma fusion applications. PIII has the advantage that very high ion fluences can be implanted over large area targets, without the beam scanning and complicated target mounts required for conventional beamline ion implantation. The PIII process involves complex physics which requires detailed study as the technology is further developed as a materials processing tool. This talk will discuss the PIII method in detail and highlight some important aspects of the underlying physics. which are being further developed in the Bradley Lab at the University of Saskatchewan.

References

[1] S. Qin, M.I. Current, S.B. Felch, and N.W. Cheung, "Plasma immersion ion implantation (PIII)"in Ion Implantation Applications, Science and Technology (J. Ziegler, ed.), Ion Implantation Technology Co., Chester, MD, USA (2012).

[2] S.K. Purdy, A.P. Knights, M.P. Bradley and G.S. Chang, "Light emitting diodes fabricated from carbon ions implanted into p-type silicon", IEEE Trans. Elect Devices 62, 914-918 (2015). doi:10.1109/TED.2015.2395995

[3] M. Risch and M.P. Bradley, "Prospects for Band Gap Engineering by Plasma Ion Implantation", physica status solidi (c) 6, S210-S213 (2009).

[4] G.R.S. Iyer, J. Wang, G. Wells, M.P. Bradley, F. Borondics, "Nanoscale imaging of nitrogen-doped single layer graphene"Nanoscale 7, 2289-2294 (2015). doi:10.1039/c4nr05385k

[5] E. Awoyele*, I.N.A. Oguocha, A. Odeshi, M.P. Bradley, "Effect of nitrogen ion implantation on the fatigue life of AISI 1018 and AISI 1045 carbon steels". 31st Canadian Materials Science Conference, University of British Columbia, Vancouver, British Columbia, Canada, June 10 13, 2019.

Author: BRADLEY, Michael

Presenter: BRADLEY, Michael

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