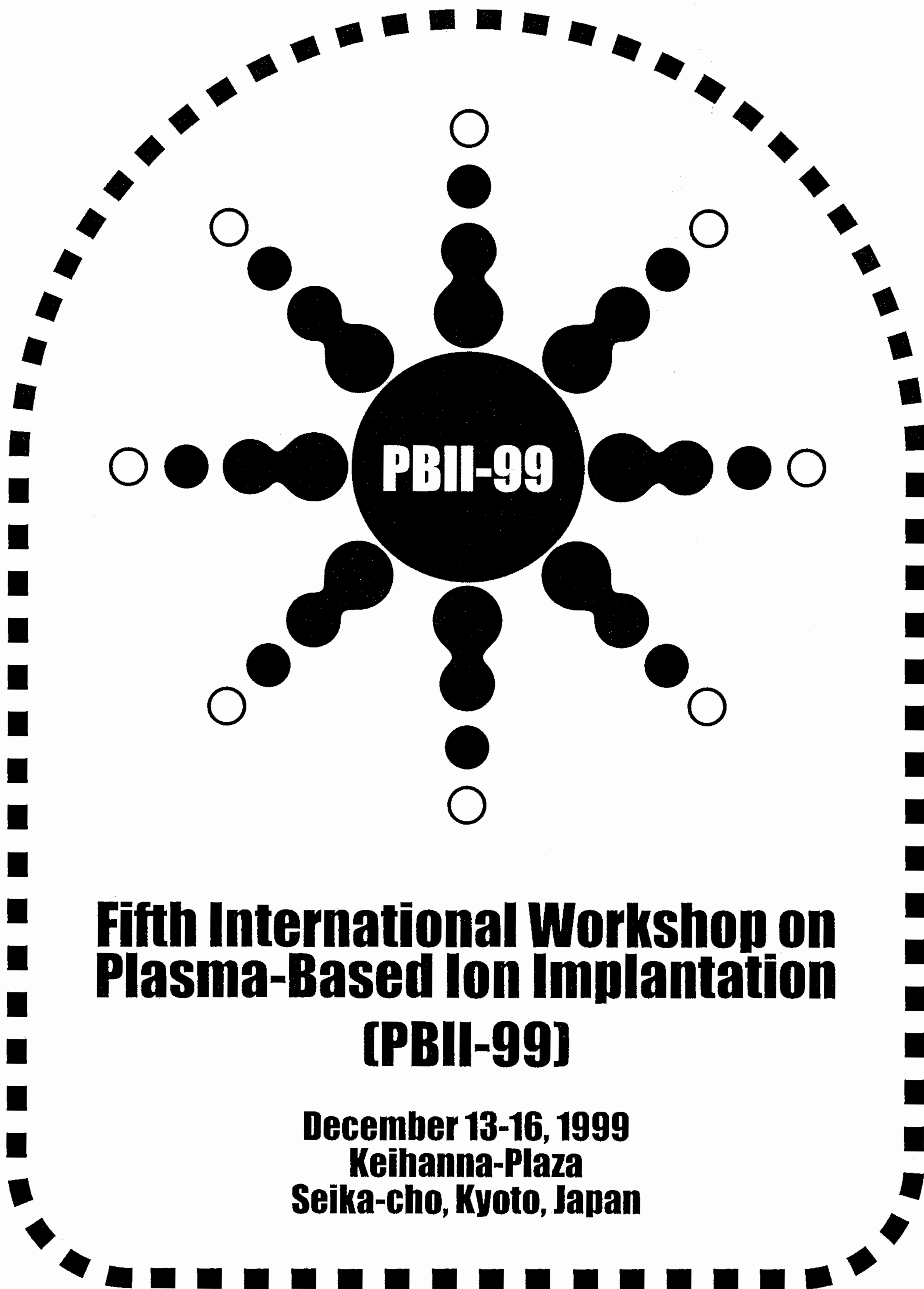

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ABSTRACTS

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Preparation of gallium nitride (GaN) and related compounds by plasma immersion ion implantation and rapid thermal annealing

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Recent advances in the preparation of gallium nitride (GaN) and related compounds have promised the production of blue semiconductor light emitting devices. Conventional preparation of GaN involves growing the material on sapphire using the metal-organic chemical vapour phase deposition (MOCVD) technique. This article will present the possibility of synthesising device-grade GaN and related materials like InN and InGaN by plasma immersion ion implantation (PIII) of nitrogen ions into the III-V semiconductor substrate followed by rapid thermal annealing. PIII offers the advantage of high efficiency and highly uniform beam density over a large area, which are particularly important for large wafer processing. The non-monoenergetic nature of the implanted ions in PIII also favors the formation of a broad depth profile of nitrogen atoms and leaving an amorphous implanted layer for rapid thermal annealing. We will discuss our characterization results, like photoluminescence, Raman scattering, X-ray diffraction, secondary ion mass spectrometry, and compare the depth profiles to numerical modeling.

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