

# Application of charged particle activation analysis at the Nishina Memorial Cyclotron Center, JRIA – Determination of nitrogen in silicon -

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## Abstract

Charged-particle activation analysis (CPAA) has been used for the determination of light elements in various high purity materials without the effect of its chemical state and the contamination caused by atmosphere. In this work, CPAA of trace amount of nitrogen in silicon has been tried at Nishina Memorial Cyclotron Center, JRIA. A new irradiation chamber was designed for CPAA. It was confirmed that irradiation and current monitoring were good. Silicon samples were bombarded with 10 MeV proton for 10 min and the  $^{14}\text{N}(p,\alpha)^{11}\text{C}$  reaction was used for determination. After irradiation, samples were decomposed with NaOH, oxidized with  $\text{KMnO}_4$ . Radioactive carbon was separated as  $\text{CO}_2$  and precipitated as lithium carbonate. The annihilation gamma-ray radiated after positron emission from  $^{11}\text{C}$  was detected with a couple of BGO-scintillation detectors and a coincidence counting system. We obtained the suitable conditions of irradiation, etching, separation and measurement, in order to propose the recommended method of CPAA of nitrogen.