



## Rapid and non-destructive analysis of glass fragments for forensic importance by determining low Z elements utilizing external PIGE method at FOTIA, BARC

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### Abstract

[en] Particle Induced Gamma-ray Emission (PIGE) is complementary technique to the conventional INAA methods. PIGE method is very sensitive to the low Z ( $Z \leq 16$ ) elements like Li, B, C, O, F, Na, Mg, Al, Si, P and S, where the neutron activation fails or very difficult to handle because of formation of short lived ( $t_{1/2} \sim$  sec to min) activation products. External PIGE method being non-destructive online method is suitable for rapid scanning and simultaneous quantification of major elemental composition of the direct glass samples important for forensic studies. Radioanalytical techniques like X-Ray Florescence (XRF) are extensively used for the scanning of materials. But, it fails to identify the low Z elements (upto Na) and others low Z with large uncertainties due to matrix effect. Glass fragments collected from the crime scene are mainly either Soda-lime (Na and Ca based) or Borosilicate glasses (B based). As glass samples composed of low Z elements (Si, Na, Ca, B and Al) at major level, they can easily be categorized into its main classes by utilizing low energy proton beam from accelerators. In view of this, the present study nails the non-destructive rapid identification of the direct glass samples with non-standard geometry using external PIGE method. In external PIGE method, direct samples were irradiated with proton beam ( $I \sim 10-15$  nA) and online measurement of prompt gamma-rays was carried out using HPGe detector

### Primary Subject

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