Particle identification method using E–ΔE detector telescope is extensively used in physics experiments. For heavy ions and fission fragments, the ΔE detector of the telescope needs to have a thickness of a few microns which is difficult to attain using conventional silicon machining process. Conventional ΔE detectors are also very fragile, and this puts serious limitation to their applications for multi detector array system. To overcome these limitations, a novel silicon detector telescope for particle identification and measurement of their energy has been developed. The thin ΔE and thick E detectors are integrated on the same silicon chip. ΔE is fabricated on the front side and E detector on the back side of the wafer, with a common buried contact. The detector is fabricated using a complex process sequence involving double sided silicon wafer processing (Fig. 1 & Fig. 2). These detectors are rugged to handle and could be used in multi-detector systems. Also, ΔE detectors with a thickness of a few microns and larger area of 100mm² or more can be fabricated using this technology. Such integrated E–ΔE detector telescopes are not commercially available. The performance of this detector has been investigated in collaboration with NPD and demonstrated to be as good as conventional telescope incorporating physically separate ΔE and E imported silicon detectors. Presently, detectors with ΔE thicknesses of 10 μm, 15 μm, and 25 μm, and E detector of thickness 300 μm have been developed. This integrated detector telescope (Fig. 3) could also find interesting applications in neutron spectrometry and medical dosimetry with good n/g discrimination. The detector design and technology can be adopted to fabricate segmented detector telescopes which could also identify the position of particles in addition to particle identification and energy measurement.

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