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A SPARK COUNTER FOR TRACK DENSITY  
DETERMINATION IN SOLID STATE TRACK DETECTORS

**ABSTRACT:** The spark counter was constructed according to the design principles given by Tomassino. The counter body and the electrodes are made of plexiglass and polished brass respectively. Electrodes are easy interchangeable and made available in different forms and sizes. Detector foils to be counted are firmly pressed between the electrode and an aluminized plastic foil. Before counting detectors are etched so that holes are developed in places where charged particles have made path. Upon application of high voltage electrical breakdowns through these holes are registered by electronic equipment. Characteristics of the counter were studied using KODAK LR115 type II stripping detectors. Detector foils were irradiated by alpha particles of about 3.5 MeV energy to different track densities. After irradiation they were etched in 10 % KOH at 60 °C. The optimum etching time was found to be 45 min. It depends to some extent on the detector material batch. At low track densities the variation of the counting efficiency with the applied high voltage was 1 % per 100 V in the middle of a plateau extending from 300 V to 550 V. At high track densities this plateau was narrower and steeper. Comparing results of counting by the spark counter and by counting under microscope a counting efficiency of  $1 \pm 5$  % was found up to track density of about  $10^4$  track  $\text{cm}^{-2}$  with the electrode of 0.5 cm in diameter. At higher track densities saturation effects are more pronounced and prevent the use of the counter at densities higher than  $2 \cdot 10^4$  track  $\text{cm}^{-2}$ . With larger electrode the saturation limit was lower being  $10^4$  track  $\text{cm}^{-2}$  for electrode diameter of 1 cm.