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# COMPARATIVE STUDIES BETWEEN POROUS SILICON AND POROUS P-TYPE GALLIUM NITRIDE PREPARED USING ALTERNATING CURRENT PHOTO-ASSISTED ELECTROCHEMICAL ETCHING TECHNIQUE

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**ABSTRACT-** Porous n-type Si and porous p-type GaN nanostructures were fabricated using alternating current photo-assisted electrochemical (ACPEC) etching in 1:4 volume ratio of hydrofluoric acid (HF) and ethanol (C<sub>2</sub>H<sub>5</sub>OH) for a duration of 30 minutes. The aim of this work is to study pore formation on the Si and p-GaN substrates in the aspects of morphological and structural changes. The morphological and structural properties of porous Si and porous p-type GaN samples have been studied using field emission scanning electron microscopy (FESEM) measurement, energy-dispersive X-ray spectroscopy (EDX), atomic force microscopy (AFM), and high-resolution X-ray diffraction (HR-XRD) in comparison to the respective as-grown sample. FESEM analysis revealed that uniform pore size with triangular-like shape was formed in porous Si sample while circular-like shape pores were formed in the porous p-type GaN sample. AFM measurement revealed that the root-mean-square surface roughness of porous Si and porous p-GaN was 6.15 nm and 5.90 nm, respectively. Detailed investigation will be presented in this work to show that ACPEC etching technique is a viable technique to produce porous nanostructures in different substrates.

**Keywords:** alternating current, etching, porous Si, p-type GaN, ultraviolet.