

ELECTRICAL PROPERTIES OF POROUS SILICON PREPARED BY PHOTOCHEMICAL ETCHING

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ABSTRACT

In this work, electrical properties of porous silicon (PS) structure fabricated by using the photochemical etching process in HF acid under different etching times was investigated. (111) n-type silicon wafers with two different resistivities ($\rho_1 = 3.25 \times 10^{-4} \Omega \text{ cm}$ and $\rho_2 = 4.3\text{-}5.6 \Omega \text{ cm}$) were used. The wafers were etched in 40% HF acid by using 100 W quartz tungsten halogen lamp integral with dichroic ellipsoidal mirror for two different etching times ($t_1 = 1800 \text{ s}$ and $t_2 = 5400 \text{ s}$). The current-voltage characteristics for all Al/PS/n-Si/Al structures show a rectifying behavior with different values of ideality factor and barrier height. The forward and reverse current show Schottky-like behavior and the presence of an inflection point in reverse a characteristic is explained by energy band gap difference between porous silicon and crystalline silicon substrates.

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