The etching of p-type silicon by silver catalysis is facilitated in an HF solution

containing HNO3 as an oxidizing agent. Silver (Ag) was electroless deposited on the

p-Si (100) surface prior to submersion in the etchant solution. On p-Si, a porous

silicon layer (PSL) was also created by stain etching in HF/HNO3. Electrochemical

impedance spectroscopy (EIS), scanning electron microscopy (SEM), energy

dispersive X-ray (EDX), atomic force microscopy (AFM), and X-ray diffraction

(XRD) were used to evaluate the properties of the produced PSL. The SEM indicates

that the best concentration of Ag+ ion to deposit on Si prior to chemical etching in

HF/HNO3 is 1 × 10-3 M. This will produce PSL with uniformly distributed pores.

According to the EIS data, coated Si dissolves more quickly in 22 M HF/0.5 M

HNO3 than untreated Si. This results in the development of a homogenous PSL with

regular round pores, which is supported by the SEM photographs. The experimental

impedance values were fitted with an equivalent electrical circuit model that

included two-time constants. Si dissolves more readily and PS develops more

quickly in the presence of higher quantities of the oxidant HNO3 or the etchant HF.

According to the AFM investigation, the Si surface's pore width and roughness

increase with increasing etching time. The crystallinity of the PSL was assessed

using X-ray spectrum diffraction at different etching periods.