Abstract

One-step and two-step metal-assisted electroless chemical etchings of p-type silicon substrate in new solutions were investigated. In the one-step etching process, the etching is performed in $NH_4HF_2/AgNO_3$ solution. On the other hand, the two-step etching process involves chemical deposition of noble metal onto silicon substrate surface followed by electroless etching in NH_4HF_2/H_2O_2 solution. The effect of several parameters on the morphology of etched layer was studied namely: pH of etching solution for the two cases and the etching temperature, the concentration of NH_4HF_2 and the type of metal deposited on silicon surface for second case. It is shown that the morphology depends strongly on etching parameters where different nanostructure shapes can be formed. An important result is that silicon nanowires are formed at pH = 4 and pH ≤ 2 for the first and second case, respectively