Si-rich silicon oxide (SRO) films were obtained by hot filament chemical vapor deposition (HFCVD) technique using SBA-15 as source of silicon and oxygen atoms. The hydrogen flow used in the growing of the SRO films was varied from 20 to 150 sccm, and all experiments were carried out at atmospheric pressure. This hydrogen flow was used as reactant gas and SBA-15 pills were used as solid source. Silicon (100) n-type was used as substrate and it was placed in a horizontal position into the reactor. From the X-ray diffraction (XRD) patterns it was observed the presence of cubic silicon oxide and cubic silicon in the SRO films. The intensity of (211) and (411) silicon planes increased when the hydrogen flow into the reactor increased as well. The (320) and (410) silicon oxide planes remained almost constant in all samples. On the other hand, from the FTIR spectra it was observed the characteristic vibration modes of silicon oxide in all samples: stretching mode at 1080 cm\(^{-1}\), bending mode at 810 cm\(^{-1}\) and rocking mode at 456 cm\(^{-1}\). In addition to these modes, one mode located at 880 cm\(^{-1}\) which is assigned to Si-H, and another mode observed at 610 cm\(^{-1}\) which is related to Si-Si bonds, were observed too. The photoluminescence spectrum shown a strong emission at 1.84 eV, when a low H\(_2\) flux was used. This emission is related to the quantum confinement effect. Besides, it was also observed another weak emissions located at 2.0 eV, and at 2.27 and 2.53 eV related to Si-H and to silicon oxide species respectively.

Keywords: SBA-15, SRO, HFCVD

Presenting author’s email: iegarcia@hotmail.com