Thin films of a-SiO*x*with values of *x*ranging from 1.13 to 1.89 were prepared by reactive evaporation of SiO in a controlled oxygen environment. The oxygen pressure in the deposition chamber was varied so as to obtain films with different values of *x*.The films were studied by x-ray photoelectron spectroscopy and optical spectrophotometry. An attempt was made to analyse the Si 2p corelevelspectra in terms of five chemically shifted components corresponding to basic Si bonding units Si–*(*Si4−*n*O*n)* with *n*= 0,1,...,4. The concentration of these bonding units as a function of oxygen concentration was in reasonable agreement with the random-bonding model, with the exception that the Si–*(*Si3O*)*component was almost completely suppressed for all stoichiometries. Films with *x*< 1.65 consisted of elemental Si and oxides of silicon, while those with *x* **>** 1.65 were almost free of Si. Films containing Si have higher refractive indices and degrees of absorption in the visible region compared with those which were free of Si.

The optical properties of the films approach those of fused silica *(*SiO2*)*as the values of *x*increase. For the films with the largest value of *x*(=1.89), the refractive index is smaller than that of fused silica. The density of these films wasestimated to be smaller than that of fused silica by about 13%.