The Group IV metal oxides ZrO
4. low leakage currents.
3. no reaction with elemental silicon which could form a
2. a dielectric constant higher than 20 compared to SiO
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2. thermal stability up to 900 °C;
3. no reaction with elemental silicon which could form a
4. low leakage currents.

The Group IV metal oxides ZrO and HfO respectively their silicates are good candidates to fulfill these
requirements (2-13). Thermal stability issues found in the case of zirconium changed the focus to the hafnium-based materials (14). SiO is introduced into these materials to increase the crystallization temperature and therefore the thermal stability. A second positive effect of adding SiO is the reduced oxygen conductivity of the films. This oxygen conductivity of ZrO and HfO films is believed to be the main reason for the formation of SiO2 respectively silicate interface layers between the substrate and the films (15-16). The main disadvantage of adding SiO is the decrease of the dielectric constant compared to pure ZrO2 and HfO2.

In contrast to HfO2 and ZrO2, TiO2 is lacking the thermodynamic stability on silicon and has a lower band gap. On the other hand, the higher dielectric constant of titanium dioxide could be advantageous (k TiO2 ~ 56 to 85; k HfO2 ~ 25 to 40) (2-5, 17).

A promising idea is therefore to dope hafnium silicate with titanium oxide to increase the permittivity of the new material while keeping the good thermal stability. Zr5Ti4O24 deposited by atomic layer deposition has been studied before (18) but no publications about Hf5Ti4Si2O14 have been presented to the best of our knowledge.

We present here an MOCVD approach for the deposition of such films, using two isostructural single source precursors, one containing hafnium and silicon and another one containing titanium and silicon. The precursors used are isostructural to the previously published single source zirconium silicate precursors recently developed in our group (10, 19-20). In distinction to the earlier studies, a liquid injection process is used in order to be able to easily adjust the ratio of the two precursors. The deposition behavior and the composition of the films was studied, as well as their optical properties.