(Supplemental)

High Wet Etch Resistance SiO_2 Films Deposited by Plasma-Enhanced Atomic Layer Deposition Using 1,1,1-Tris(dimethylamino)disilane

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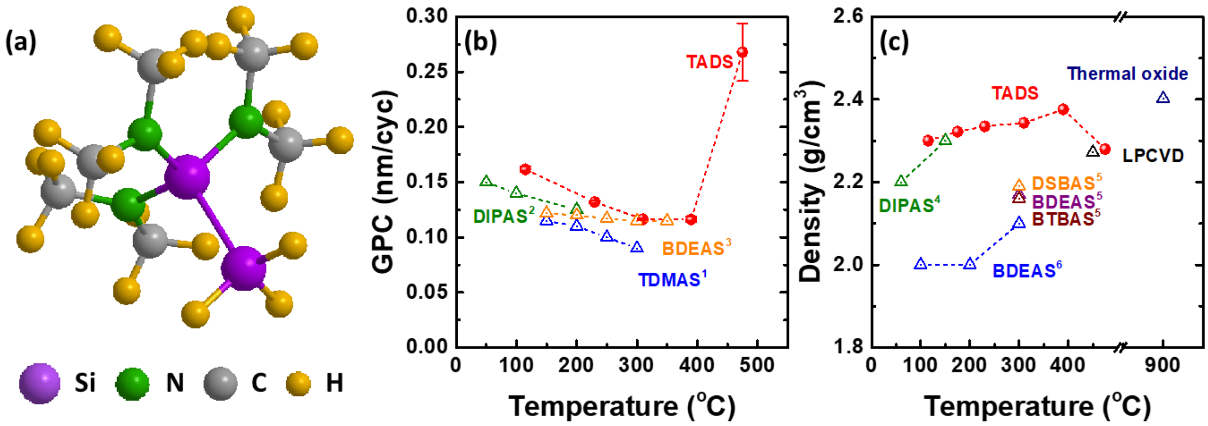

Figure 1. (a) Molecular structure of 1,1,1-tris(dimethylamino)disilane (TADS). The Si-Si bond can provide a higher molecular polarity and surface reactivity, which can be helpful for high-quality ALD SiO_2 films. (b) In the temperature range of 115–390 ºC, TADS exhibits higher or at least comparable GPC in comparison with other aminosilane precursors. (c) The SiO_2 films of TADS have not only high bulk film densities (< 2.38 g/cm^3 at 390 ºC), which is higher than that (2.27 g/cm^3) of LPCVD SiO_2 or close to that (2.4 g/cm^3) of thermal oxide, but also high wet etch resistance with a WER of >1.6 nm/min in 200:1 HF.

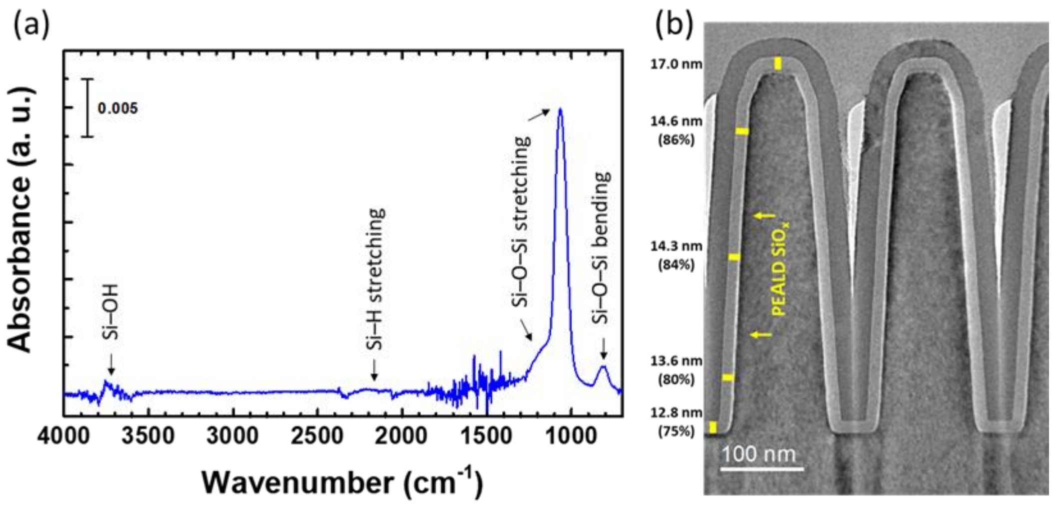

Figure 2. (a) In FTIR spectrum, two distinct peaks corresponding to Si–O bonds are observed without any distinguishable Si–H bonds. This implies almost complete transformation of Si–H bonds in TADS to Si–O bonds during the process. (b) The conformality of the PEALD SiO_2 films is shown in high aspect ratio nanotrenches. Based on the high step coverage (>75%), TADS can be potentially used for depositing highly conformal SiO_2 films for semiconductor devices.

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