Deposition of Inherently Ferroelectric Films by ALD using HfD-04 and ZrD-04

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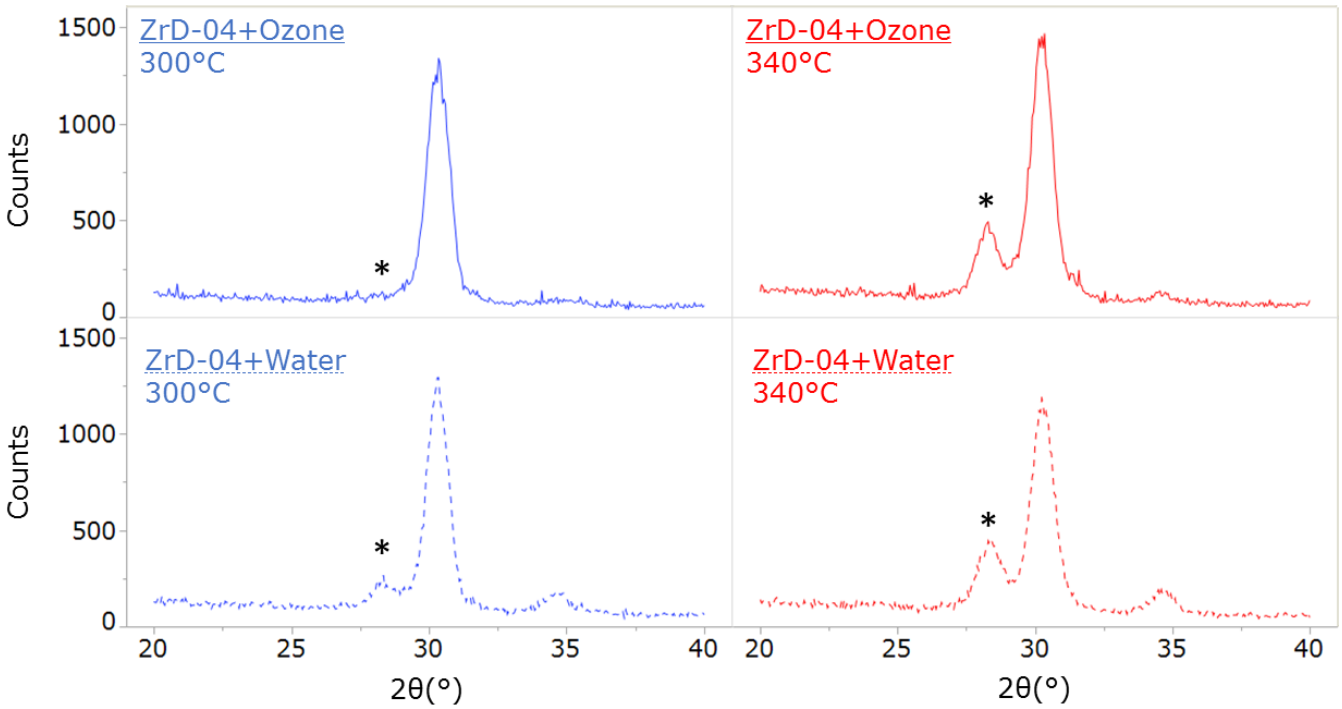

Fig. 1. GIXRD patterns for as-deposited ZrO_2 films grown with ZrD-04 and water (dashed lines) or ozone (solid lines) at 300°C (blue) or 340°C (red). The {-111} monoclinic peak (*) is substantially suppressed in films grown at the lower temperature with ozone. The thickness of the films was 105-120Å.

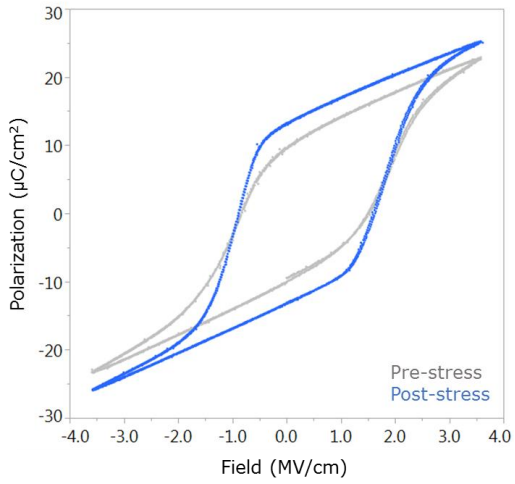

Fig. 2. Plot of polarization vs. applied electric field for an 8.4 nm-thick blended HfO_2/ZrO_2 film (alternating between ZrO_2 and HfO_2 cycles). The film was crystalline as deposited and did not undergo high temperature post-deposition or post-metallization annealing. PVD TiN was used for both top and bottom electrodes. The grey curve is the polarization measured before electrical stress, and the blue curve is the polarization measured after electrical stress.