## List of supplementary figures

**Figure S0:** composition of thin films of (Ni-Ti) as a function of the power applied to the Ti cathode ( $P_{RF}(Ti)$ ) while keeping the power applied to the Ni target ( $P_{RF}(Ni)$ ) fixed at 20 W for all samples.

**Figure S1**: Image simulations of two most informative [100] and [210] zone axis of ilmenite (IL) (left panel) and LN type (right panel) structures and corresponding calculated ED patterns.

**Figure S2**: SEM Plane view of NiTiO3 thin films deposited for 3 h at 550°C (a) and 650°C (b). The scale is indicated by the white bar. The thickness for each sample is estimated at 120 nm

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