Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Giant dielectric response and relaxation behavior in (Tm + Ta) co-doped TiO_2 ceramics

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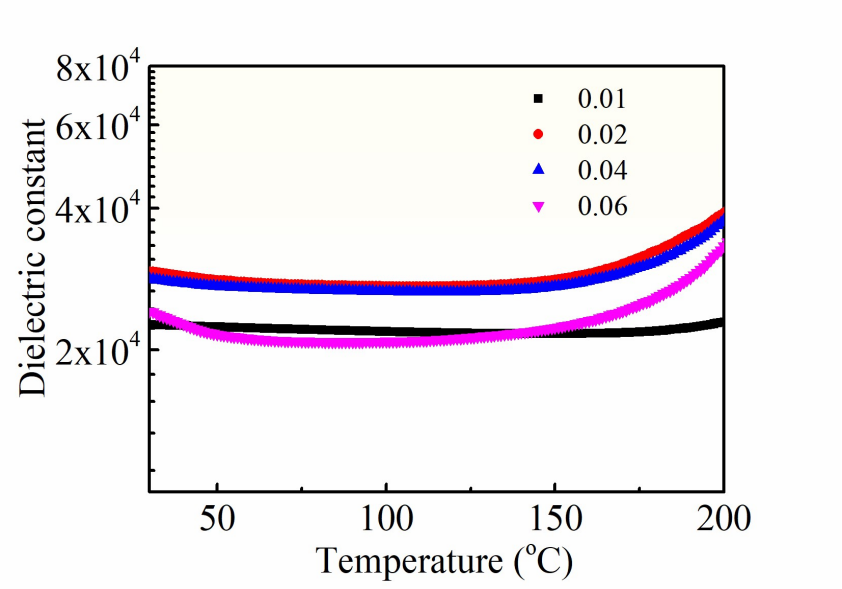

Fig. S1. Compositional dependence of dielectric constant at 1 kHz.

For practical applications in electronic devices, the temperature coefficient of ε′ ($(\Delta\varepsilon'(T)/\varepsilon'_{25}$, calculated at 1 kHz) should be less than ± 15% relative to room temperature for X-R type capacitors. At 1 kHz, the temperature coefficients of $(Tm_{0.5}Ta_{0.5})_{0.01}Ti_{0.99}O_2$ ceramics (x=0.01 - 0.06) are 1.2%, 18%, 27% and 37% in the range of 30 ~ 200℃, respectively. It can be seen that the composition with x = 0.1 has excellent temperature stability.

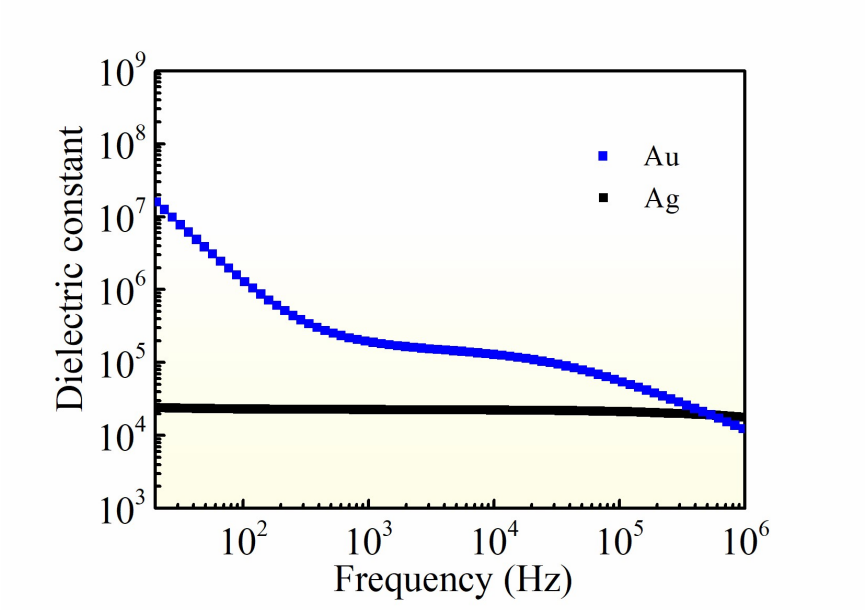

Fig. S2. Dielectric constant of $(Tm_{0.5}Ta_{0.5})_{0.01}Ti_{0.99}O_2$ with Ag and Au electrodes.

Fig. S2 shows dielectric performance of Tm + Ta co-doped rutile TiO_2 (x = 0.01) with different electrodes (Au and Ag). As seen, the sample with Au electrode shows much higher permittivity than that with Ag electrode, indicating electrode effect greatly contributes to CP behavior at least in the low frequency range.