Thick composite magnetoelectric films by electrophoretic deposition

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Microstructural analysis of TiO$_2$-CoFe$_2$O$_4$ film

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EPD to produce nanostructured ME composite bilayers films

➢ Chemical reactions

➢ ME coupling effect
Results

CFO/TO: 98% relative density; 25vol% TiO$_2$; 75vol% CFO

PZTN: 95% relative density

Piezoelectric properties!
Contribution

EPD film on Ag-coated alumina
Sintered at 800°C x 1h

Ag-coated alumina was used to produce CoFe$_2$O$_4$ layer embedded in silver

Step:

a) Co-deposition CFO/TO
b) Drying and sintering
c) Deposition PZTN
d) Drying and sintering
e) Metallization
f) Poling

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Impact

The graphs show the frequency (Hz) versus permittivity ($\varepsilon'$) and loss tangent ($\tan\delta$) for different materials:

- **$\varepsilon'$ vs. Frequency (Hz)**
  - **M**
  - **E**
  - **PZTN**

- **$\tan\delta$ vs. Frequency (Hz)**
  - **$\tan\delta$**
  - **CFO**

The materials listed include:

- $\text{TiO}_2$
- $\text{PZTN}$
- CFO

These graphs are useful for understanding the electrical properties of these materials across a range of frequencies.
Thank you for your kind attention