Supplementary Information for:

Enhanced electrorheology of suspensions containing sea-urchin-like hierarchical Cr-doped titania particles

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1. **SEM images of pure titania particles with sea-urchin-like hierarchical morphology**

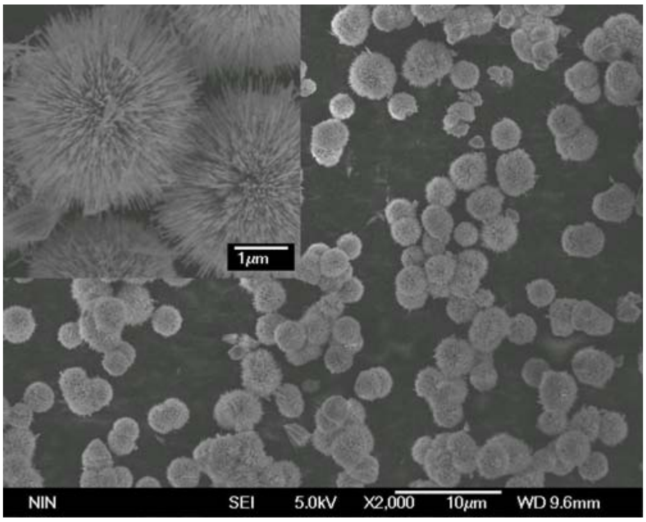


Fig. S1 SEM images of pure titania particles with sea-urchin-like hierarchical morphology.

Fig. S1 shows that the non-doped particles synthesized by the solvothermal process also possess the similar sea-urchin-like hierarchical morphology but their particle sizes are slightly smaller than that of Cr-doped ones and the size distribution becomes broad.

2. N_2 adsorption-desorption isotherms

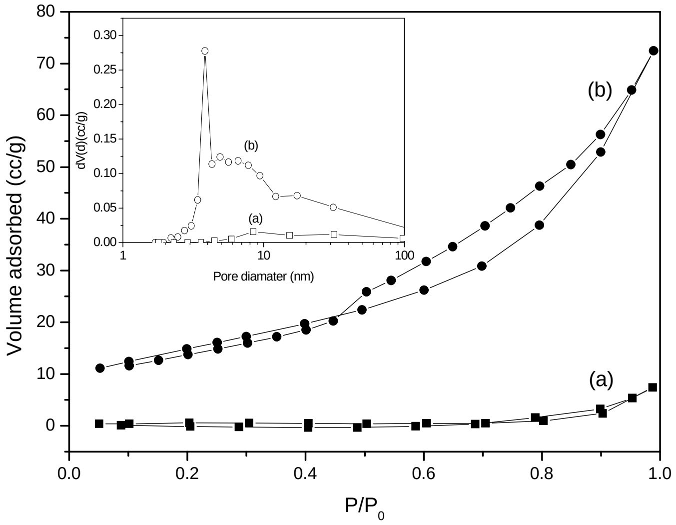


Fig. S2 N_2 adsorption-desorption isotherms of Cr-doped titania particles (a) smooth; (b) hierarchical. The inset is corresponding BJH pore size distribution.

Fig. S2 indicates that the BET surface area (S_{BET}) of hierarchical Cr-doped titania particles is 65 m^2/g, which is about 13 times as high as that of smooth Cr-doped titania particles (S_{BET} = 5.3 m^2/g).

3. SEM image of Cr-doped titania particles with a changed surface morphology

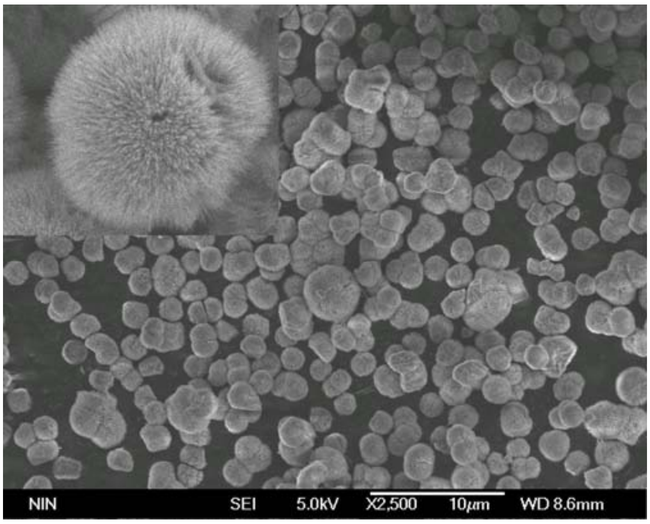


Fig. S3a SEM image of Cr-doped titania particles with a less well-developed sea-urchin-like nanostructure.

Fig. S3a presents the SEM image of the particles prepared by the process that is similar to the hierarchical particles described in Experimental Section except that the solvothermal temperature is decreased to 120^{o}C and reaction time is decreased to 8 h. It is found that the particles still possess sea-urchin-like hierarchical morphology though the nanorods become thin.

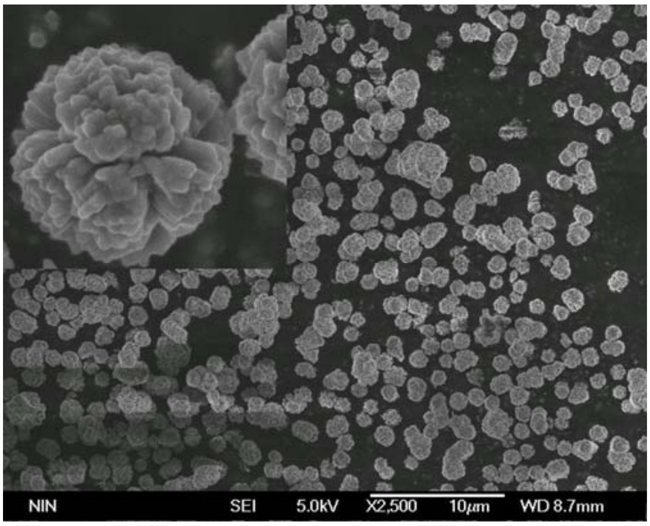


Fig. S3b SEM image of Cr-doped titania particles with a coarse surface

Fig. S3b presents the SEM image of the particles prepared by the process that is similar to the hierarchical particle described in Experimental Section except that small amount of surfactant (Span 80) is added in the reaction. These particles have no sea-urchin-like nanostructure but the surface of particles is relatively coarser compared to the smooth particles.

4. Frequency dependence of storage modulus and loss modulus of pure titania particles suspensions

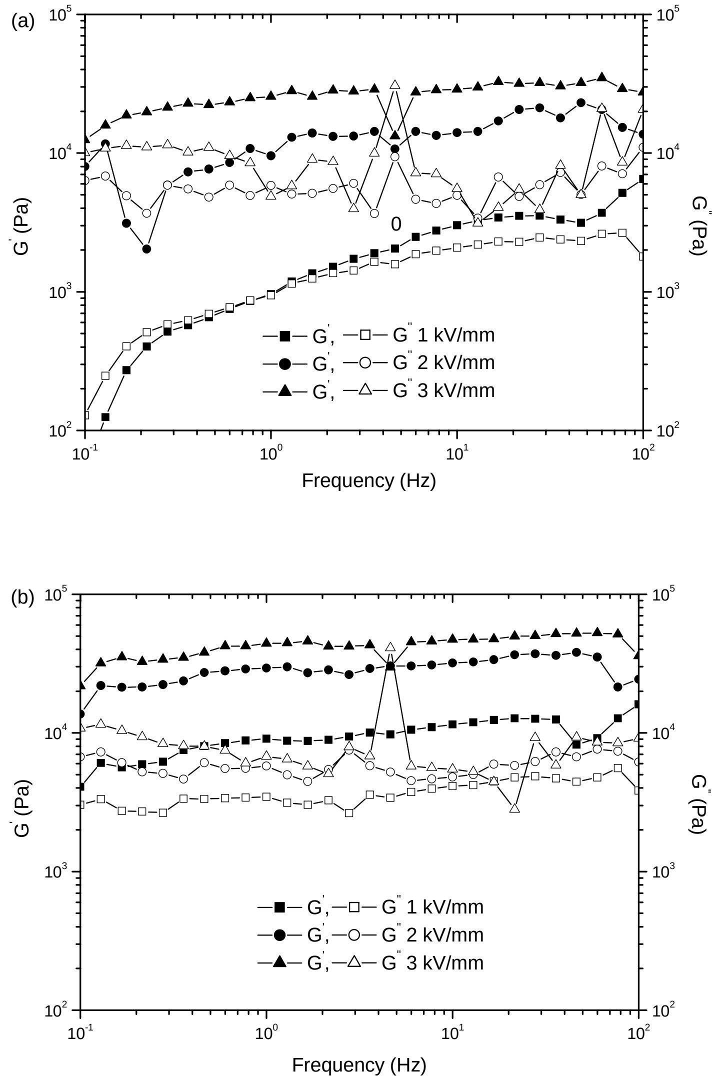
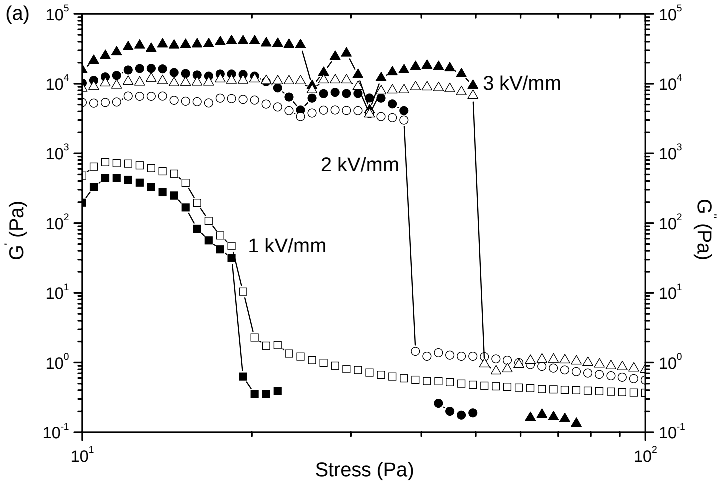


Fig. S4 Frequency dependence of storage modulus ($G^{'}$, solid dots) and loss modulus ($G^{''}$, open dots) for suspensions of pure titania particles: (a) smooth; (b) hierarchical. (T=23 ^{o}C, 10 vol%, Applied stress=10 Pa).

Fig. S4 shows that the hierarchical pure titania suspension also possesses the larger storage modulus compared to smooth pure titania suspension at the same electric field.

5. Stress dependence of storage modulus and loss modulus of pure titania particles suspensions



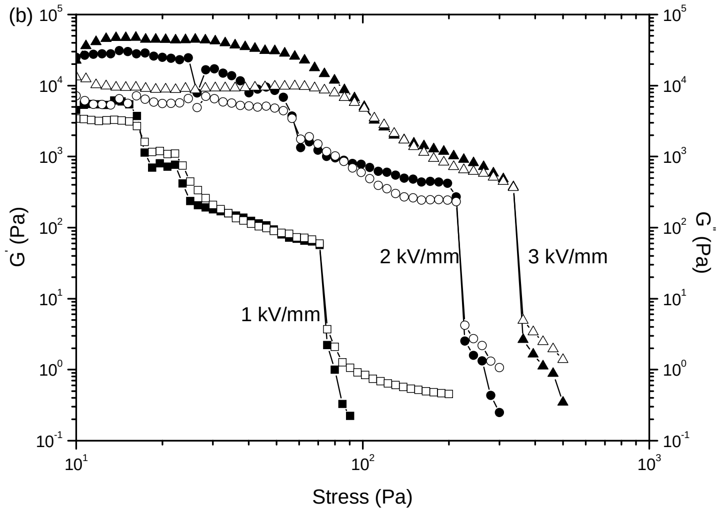


Fig. S5 Stress dependence of storage modulus (G', solid dots) and loss modulus (G'', open dots) for suspensions of pure titania particles: (a) smooth; (b) hierarchical. (T=23 ^{o}C, 10 vol%, Applied frequency=0.5 Hz).

Fig. S5 shows that the moduli of smooth pure titania suspension remains constant at the low stress region and suddenly drops at the yield point. However, the moduli of hierarchical pure titania suspension shows a shoulder-like drop. The results are similar to those of the hierarchical titania suspensions, indicating that under electric fields the hierarchical titania suspension has a different structuring process from the non-hierarchical smooth titania suspension.