Electric field switched surface topography of fingerprint liquid-crystal network polymer coating

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Electric field switched surface topography of fingerprint liquid-crystal network polymer coating
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INTRODUCTION
Solar cell panels in deserts could be easily contaminated by sand after a storm. In these remote places it is not practical and economical to manually clean the panels by men. One possible solution to achieve dry self-cleaning is using switchable surface topographies to mechanically slide off the sand.

METHODS
The coating is based on liquid crystal network (LCN) with a fingerprint texture. The LCN is made of dielectric liquid crystal mesogens. The chiral nematic liquid crystals are coated on the Interdigitated Electrode (IDE) substrate with vertical aligned polyimide boundary to form the fingerprint texture.

RESULTS
When electric field is switched on:
• Oscillation of dielectric mesogens in high frequency AC electric field results in order parameter reduction.
• The decrease of order parameter causes planar domains to go up and homeotropic domains to go down, inducing inversion of the surface topography.

CONCLUSIONS
Our novel design of the smart surface, based on fingerprint liquid crystal network shows substantial and reversible changes of surface topography in response to the electric field, showing potentials in dry self-cleaning application.

REFERENCES

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