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

Citation for published version (APA):

DOI:
10.1117/12.2287180

Document status and date:
Published: 01/01/2018

Document Version:
Accepted manuscript including changes made at the peer-review stage

Please check the document version of this publication:
- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

Link to publication

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:
www.tue.nl/taverne

Take down policy
If you believe that this document breaches copyright please contact us at:
openaccess@tue.nl
providing details and we will investigate your claim.

Download date: 01. Nov. 2023
Electric field switched surface topography of fingerprint liquid-crystal network polymer coating

Wei Feng, Danqing Liu, Dirk J. Broer
Department of Chemical Engineering and Chemistry, Eindhoven University of Technology

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


Acknowledgement: NWO (Netherlands Organisation for Scientific Research), ERC (European Research Council)