

Accepted Manuscript

Dynamics of an evaporating thin film of polar liquid with solutocapillary Marangoni effect and capillary osmosis

Varvara Yu. Gordeeva, Andrey V. Lyushnin

PII: S0257-8972(16)31131-8
DOI: doi:[10.1016/j.surfcoat.2016.11.025](https://doi.org/10.1016/j.surfcoat.2016.11.025)
Reference: SCT 21771

To appear in: *Surface & Coatings Technology*

Received date: 18 August 2016
Revised date: 3 November 2016
Accepted date: 9 November 2016



Please cite this article as: Varvara Yu. Gordeeva, Andrey V. Lyushnin, Dynamics of an evaporating thin film of polar liquid with solutocapillary Marangoni effect and capillary osmosis, *Surface & Coatings Technology* (2016), doi:[10.1016/j.surfcoat.2016.11.025](https://doi.org/10.1016/j.surfcoat.2016.11.025)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Dynamics of an evaporating thin film of polar liquid with solutocapillary Marangoni effect and capillary osmosis

Varvara Yu. Gordeeva^{a,1}, Andrey V. Lyushnin^b

^a varynka@gmail.com, Perm National Research Polytechnic University, Lysva branch, 618910, Russia, Perm territory, Lysva, Gaidara, 26-16

¹ Author to whom correspondence should be addressed.

Tel.: (007) 908 27 24 955

^b andry@pspu.ru, Perm State Humanitarian-Pedagogical University, 614990, Russia, Perm, Sibirskaya, 24

ABSTRACT

The stability of the thin film of the polar liquid on the solid substrate with the hydrodynamic slip boundary condition is investigated in relation to the solutocapillary Marangoni effect. The solutocapillary Marangoni effect is driven by a surfactant changing the surface tension of the liquid. We hypothesize, that the bulk concentration of the surfactant changes linearly from the value on the solid-liquid interface to the value on the liquid-gas interface. The critical Marangoni numbers were found for various parameters responsible for solvent evaporation, surfactant diffusion, and surfactant solubility. We found, that only an anti-surfactant increasing the surface tension can destabilize the system under stated conditions and the adopted hypothesis. It was also observed, that the fluid slip along the substrate destabilizes the system slightly, and the diffusion along the liquid-gas interface stabilizes the film regarding the solutocapillary Marangoni effect.

Keywords:

polar liquid, slipping, Marangoni effect, surfactants, thin films

Download English Version:

<https://daneshyari.com/en/article/5465015>

Download Persian Version:

<https://daneshyari.com/article/5465015>

[Daneshyari.com](https://daneshyari.com)