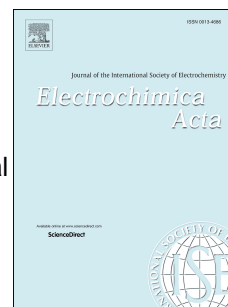


Accepted Manuscript

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PII: S0013-4686(18)30332-3

DOI: [10.1016/j.electacta.2018.02.050](https://doi.org/10.1016/j.electacta.2018.02.050)

Reference: EA 31245

To appear in: *Electrochimica Acta*

Received Date: 23 December 2017

Revised Date: 25 January 2018

Accepted Date: 8 February 2018

Please cite this article as: Q. Liu, Q. Chen, Q. Zhang, G. Dong, X. Zhong, Y. Xiao, M.-P. Delplancke-Ogletree, Franç. Reniers, X. Diao, Dynamic behaviors of inorganic all-solid-state electrochromic device: Role of potential, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.02.050.

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Dynamic behaviors of inorganic all-solid-state electrochromic device: Role of potential

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Abstract

Applied potential plays a significant role in the properties of electrochromic devices (ECDs), for example, cyclic property, optical modulation, and response rate. In this study, inorganic all-solid-state ECDs with the multilayer structure of Glass/ITO/NiO_x/Ta₂O₅/LiNbO₃/Ta₂O₅/WO₃/ITO were prepared by magnetron sputtering. The potential dependence of charges dynamic behaviors in the ECDs were analyzed on the basis of cyclic voltammograms (CVs), chronoamperograms (CAs), multi-potential steps, and *in-situ* optical transmittance at 550 nm. Results demonstrated that the trapping of Li⁺ ions in NiO_x layer and in WO₃ layer were responsible for the degradation of electrochromic properties of the ECDs operated at different potential ranges. Besides, the dynamic behavior of Li⁺ ions in WO₃ layer, acting as the primary electrochromic layer in the ECDs, had a crucial influence on the response characteristics of the ECDs. Excellent optical memory effects at randomly electrochromic extent were observed and the corresponding open-circuit potential was relevant to the chemical potential of the ECDs.

Keywords: Electrochromic device, Dynamic behaviors, Inorganic, Applied potential, All-solid-state

1 Introduction

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