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Manuel Palencia, Tulio Lerma, Víctor Palencia



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## Description of fouling, surface changes and heterogeneity of membranes by color-based digital image analysis

Manuel Palencia <sup>a\*</sup>, Tulio Lerma <sup>a</sup>, Víctor Palencia <sup>b</sup>

<sup>a</sup> Department of Chemistry, Faculty of Natural and Exact Science, Universidad del Valle, Cali - Colombia

<sup>b</sup> Department of Programming and Software Engineering, Mindtech s.a.s., Barranquilla - Colombia

\*Corresponding author: Manuel Palencia, Ph. D. Tel.: +57 2 3393248 ext. 133  
manuel.palencia@correounivalle.edu.co

### Abstract

This paper proposes the implementation of digital image analysis for the easy, fast and simple description of membrane surface changes as a result of fouling or any process with capacity to produce, directly or indirectly, color changes on the surface. For that, a color amount descriptor is used to generate a quantitative measurement of changes experimented on membrane. By ultrafiltration experiments, membranes with different cut-off (1, 10, 50 and 100 kDa) were fouled using aqueous extracts of plant leaves (*P. alvaradoii*). Surface changes of membranes were analyzed by attenuated total reflectance, permeability analysis and image analysis. Results evidence the applicability of surface color index ( $I_{sc}$ ) for the description of fouling and membrane surface changes. In addition, results suggest that image analysis using color-based quantitative descriptors can be used to description of surface anisotropy of membranes and easily correlated with permeability and fouling layer thickness.

**Keywords:** *RGB model, fouling, surface heterogeneity, surface color index*

### 1. Introduction

Fouling can be defined as an alteration of membrane surface caused by interactions between the membrane and components in the feed. It is the main problem in membrane-based processes

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