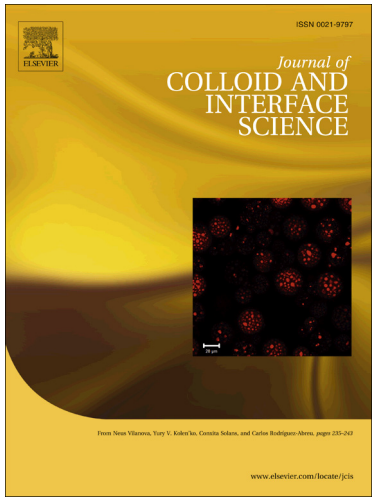

Regular Article

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PII: S0021-9797(17)30228-X
DOI: http://dx.doi.org/10.1016/j.jcis.2017.02.057
Reference: YJCIS 22084

To appear in: *Journal of Colloid and Interface Science*

Received Date: 28 December 2016
Revised Date: 22 February 2017
Accepted Date: 23 February 2017

Please cite this article as: S. Shabaniverki, J.J. Juárez, Characterizing Gelatin Hydrogel Viscoelasticity with Diffusing Colloidal Probe Microscopy, *Journal of Colloid and Interface Science* (2017), doi: http://dx.doi.org/10.1016/j.jcis.2017.02.057

Characterizing Gelatin Hydrogel Viscoelasticity with Diffusing Colloidal Probe Microscopy

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Abstract

In this study, we investigate viscoelasticity in gelatin hydrogels using diffusing colloidal probe microscopy (DCPM) to directly measure the elastic potential energy interaction between colloidal probes and the underlying viscoelastic media. Gelatin samples are prepared in four different concentrations between 0.3 wt% to 0.6 wt% to examine changes in viscoelasticity with concentration. A force balance describing the interaction between the colloidal probes and the hydrogel as a spring-damper system lead to a simple model for mean square displacement. A histogram of locations sampled by the colloidal probes is directly related to the elastic potential energy and the effective spring constant of the gelatin hydrogels. The effective spring constant is a fixed parameter used in the mean square displacement model to find effective viscosity. These parameters are comparable to viscoelastic parameters obtain by a microrheology analysis of two-dimensional mean square displacements. These results can serve as a guide for assessing hydrogel systems where viscoelastic properties are an important factor in biomaterial design.