

Accepted Manuscript

Viscoelastic properties of microgel thin films control fibroblast modes of migration and pro-fibrotic responses

Daniel Chester, Rahul Kathard, Jeremy Nortey, Kimberly Nellenbach, Ashley C. Brown



PII: S0142-9612(18)30643-4

DOI: [10.1016/j.biomaterials.2018.09.012](https://doi.org/10.1016/j.biomaterials.2018.09.012)

Reference: JBMT 18883

To appear in: *Biomaterials*

Received Date: 17 May 2018

Revised Date: 20 August 2018

Accepted Date: 7 September 2018

Please cite this article as: Chester D, Kathard R, Nortey J, Nellenbach K, Brown AC, Viscoelastic properties of microgel thin films control fibroblast modes of migration and pro-fibrotic responses, *Biomaterials* (2018), doi: 10.1016/j.biomaterials.2018.09.012.

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.

Viscoelastic Properties of Microgel Thin Films Control Fibroblast Modes of Migration and Pro-fibrotic Responses

Daniel Chester^{1,2}, Rahul Kathard¹, Jeremy Nortey¹, Kimberly Nellenbach^{1,2}, Ashley C. Brown^{*1,2}

¹Joint Department of Biomedical Engineering, North Carolina State University and University of North Carolina at Chapel-Hill, Raleigh NC; ²Comparative Medical Institute, North Carolina State University, Raleigh NC

*Corresponding Author

Ashley C. Brown, PhD

Joint Department of Biomedical Engineering

North Carolina State University and University of North Carolina at Chapel-Hill

911 Oval Drive

4204B Engineering Building III

Raleigh, NC 27606

(919) 513-8231

aecarso2@ncsu.edu

Keywords: microgels, colloidal thin film, fibroblasts, mechanotransduction, self-healing

Abstract:

Cell behavior is influenced by the biophysical properties of their microenvironments, and the linear elastic properties of substrates strongly influences adhesion, migration, and differentiation responses. Because most biological tissues exhibit non-linear elastic properties, there is a growing interest in understanding how the viscous component of materials and tissues influences cell fate. Here we describe the use of microgel thin films with controllable non-linear elastic properties for investigating the role of material loss tangent on cell adhesion, migration, and myofibroblastic differentiation, which have implications in fibrotic responses. Fibroblast modes of migration are dictated by film loss tangent; high loss tangent induced ROCK-mediated amoeboid migration while low loss tangent induced Rac-mediated mesenchymal cell migration. Low loss tangent films were also associated with higher levels of myofibroblastic differentiation. These findings have implications in fibrosis and indicate that slight changes in tissue viscoelasticity following injury could contribute to early initiation of fibrotic related responses.

Download English Version:

<https://daneshyari.com/en/article/11028459>

Download Persian Version:

<https://daneshyari.com/article/11028459>

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