

Accepted Manuscript

Fabrication, Detection, and Analysis of DNA-labeled PLGA Particles for Environmental Transport Studies

Coy P. McNew, Chaozi Wang, M. Todd Walter, Helen E. Dahlke

PII: S0021-9797(18)30446-6
DOI: <https://doi.org/10.1016/j.jcis.2018.04.059>
Reference: YJCIS 23524

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

Received Date: 27 October 2017
Accepted Date: 15 April 2018



Please cite this article as: C.P. McNew, C. Wang, M. Todd Walter, H.E. Dahlke, Fabrication, Detection, and Analysis of DNA-labeled PLGA Particles for Environmental Transport Studies, *Journal of Colloid and Interface Science* (2018), doi: <https://doi.org/10.1016/j.jcis.2018.04.059>

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.

Fabrication, Detection, and Analysis of DNA-labeled PLGA Particles for Environmental Transport Studies

Coy P. McNew^{a,*}, Chaozi Wang^a, M. Todd Walter^b, Helen E. Dahlke^a

^a*Department of Land, Air, and Water Resources, University of California, Davis, Davis, CA 95616, USA*

^b*Department of Biological and Environmental Engineering, Cornell University, Ithaca, NY 14853, USA*

Abstract

Poly(lactic-co-glycolic acid) (PLGA) particle carriers of synthetic DNA have recently received increased attention for environmental applications due to their biodegradability, customizability, and nearly limitless number of uniquely identifiable “labels”. In this paper, we present methodologies for the preparation of DNA-labeled particles, control of particle size, extraction of DNA-labels, and analysis via quantitative polymerase chain reaction (qPCR). Characterization and analysis of the DNA-labeled particles reveal spherical particles of diameters ranging from 60 – 1,000 nm, with consistent zeta potentials around -45 mV, that are stable to aggregation, even in the presence of concentrated mono- and divalent cations. A highly correlated and consistent relationship between particle concentration and DNA-label count was observed, with a detection range spanning 7 orders of magnitude, from 0.01 - 10,000 mg/L ($10 - 10^7$ particles/ μ L). The results of two environmental applications of the DNA-labeled particles are also presented, highlighting their feasibility for use in environmental studies. Whether exploring size-dependent transport phenomena or identifying potential pathogen transport pathways, the DNA-labeled particle approach presented here provides a powerful tool for the identification of overlapping particle signals at a range of concentrations.

*Corresponding author

Email address: cpmcnew@ucdavis.edu (Coy P. McNew)

Download English Version:

<https://daneshyari.com/en/article/6990302>

Download Persian Version:

<https://daneshyari.com/article/6990302>

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