Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

A Physically Motivated and Improved Fitting Function to Analyze the Performance of Passive Drug Delivery Systems: Going Beyond the Weibull Empirical Fits GARY W. SLATER, MYKYTA V. CHUBYNSKY, MAXIME IGNACIO, University of Ottawa — We examine the diffusion-controlled release of molecules from passive drug delivery systems using both analytical solutions of the diffusion equation and numerically exact Monte Carlo data. Not surprisingly, the release process follows a sqrt(t) law for short times, as expected for diffusion processes, while the long-time asymptotic behavior is exponential. The cross-over time between these two limits is determined by the initial loading of the system if the latter is inhomogeneous. Although the widely used Weibull function provides a reasonable fit (at least visually), it has two major shortcomings: (i) its limiting behaviours are wrong and (ii) there is no connection between the system's properties and the value of the fitting parameters. We introduce a new, physically motivated interpolating fitting function that correctly includes both time regimes and clearly outperform the Weibull function. An analysis of the new function allows us to predict the values of the Weibull parameters.

Gary W. Slater
University of Ottawa

Date submitted: 10 Nov 2016 Electronic form version 1.4