Abstract Submitted
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Nuclemeter: A Reaction-Diffusion Column for Quantifying Nucleic Acids Undergoing Enzymatic Amplification[1] HAIM BAU, CHANGCHUN LIU, CHITVAN KILLAWALA, MOHAMED SADIK, MICHAEL MAUK, University of Pennsylvania — Real-time amplification and quantification of specific nucleic acid sequences plays a major role in many medical and biotechnological applications. In the case of infectious diseases, quantification of the pathogen-load in patient specimens is critical to assessing disease progression, effectiveness of drug therapy, and emergence of drug-resistance. Typically, nucleic acid quantification requires sophisticated and expensive instruments, such as real-time PCR machines, which are not appropriate for on-site use and for low resource settings. We describe a simple, low-cost, reactiondiffusion based method for end-point quantification of target nucleic acids undergoing enzymatic amplification. The number of target molecules is inferred from the position of the reaction-diffusion front, analogous to reading temperature in a mercury thermometer. We model the process with the Fisher Kolmogoroff Petrovskii Piscounoff (FKPP) Equation and compare theoretical predictions with experimental observations. The proposed method is suitable for nucleic acid quantification at the point of care, compatible with multiplexing and high-throughput processing, and can function instrument-free.

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