

DNA Directed Assembly Probe for Detecting DNA-Protein Interaction in Microarray Format

Jin Kiat Ng¹, Parayil Kumaran Ajikumar¹, Yew Chung Tang¹, Gregory Stephanopoulos^{1,2},
Heng-Phon Too^{1,3}

¹ MEBCS Program, Singapore-MIT Alliance, National University of Singapore, Singapore 117546

² Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139,
USA

³ Department of Biochemistry, Yong Loo Lin School of Medicine, National University of Singapore,
Singapore 117597

Abstract—Quantifying DNA-protein interaction using DNA microarrays are gaining increasing attention due to their ability to profile specificity of interactions in a high-throughput manner. This paper describes a new approach that used the ability of ssDNA-dsDNA probe to complex with DNA binding proteins in the solution phase and then spatially immobilized onto microarray through specific DNA hybridization. In one case, the Spatially Addressable DNA Array (SADA) approach demonstrated that enzymatic cleavage in solution is more efficient than if conducted heterogeneously. In addition, binding of RNA polymerase with promoter DNA could be detected with this strategy.

Index Terms —DNA-protein interaction, DNA directed assembly, Restriction enzyme, RNA polymerase, ssDNA-dsDNA conjugate.