

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Reagent-free ultrasensitive spectroscopic probes for long term diabetes monitoring¹

N.C. DINGARI, I. BARMAN, J.W. KANG, Laser Biomedical Research Center, G. R. Harrison Spectroscopy Laboratory, MIT, G. HOROWITZ, Division of Clinical Pathology, Beth Israel Deaconess Medical Center, Harvard Medical School, RAMACHANDRA RAO DASARI, Laser Biomedical Research Center, G. R. Harrison Spectroscopy Laboratory, MIT — Long-term glycemic control is essential in developing therapeutics for diabetics. Glycated hemoglobin (HbA1c) and glycated albumin have been increasingly accepted as a functional metric of glycemic control over the past two to three months and three weeks, respectively. In this talk, we present the first demonstration of non-enhanced Raman spectroscopy as a novel analytical method for quantitative detection of HbA1c and glycated albumin. Using the drop coating deposition Raman technique, we observe that the non-enzymatic glycosylation of these proteins results in subtle, but consistent, changes in vibrational features, which with the help of multivariate classification techniques can be used to discriminate the glycated proteins from their unglycated variants with 100%. Additionally, the developed multivariate calibration models show a high degree of prediction accuracy even at substantially lower concentrations than those typically encountered in clinical practice. The excellent accuracy and reproducibility achieved in this proof-of-concept study opens substantive avenues for basic investigations of glycated proteins as well as in high-throughput glycemic marker sensing in multi-component mixtures and potentially even in serum and whole blood samples.

Narahara Chari Dingari
Laser Biomedical Research Center, G. R. Harrison Spectroscopy Laboratory,
MIT, Cambridge, MA 02139, USA

¹The Massachusetts Institute of Technology Center for Research in
Biotechnology, Cambridge, MA 02139, USA
sources for their grant P41-RR02594, at the MIT Laser Biomedical Re-