Enhanced Laser Desorption/Ionization Mass Spectrometric Detection of Biomolecules Using Gold Nanoparticles, Matrix and the Coffee Ring Effect

Alyssa L. M. Marsico, Bradley Duncan, Ryan F. Landis, Gulen Yesilbag Tonga, Vincent M. Rotello, Richard W. Vachet*

Corresponding Author
*Richard W. Vachet: e-mail, rwvachet@chem.umass.edu; phone, (+1) 413-545-2733; fax, (+1) 413-545-4490.
Department of Chemistry, University of Massachusetts, Amherst, Massachusetts 01003, United States

Table of Contents

Figure S-1: Optical images of spots with AuNPs, bradykinin and different concentrations of CHCA; page S-2

Figure S-2: Example mass spectra from inside and on the formed coffee ring; page S-3

Figure S-3: Example mass spectra from the analysis of other peptides using AuNPs, added matrix and the coffee ring effect as compared to conventional MALDI; page S-4

Figure S-4: Example mass spectra from the analysis of a myoglobin digest with AuNPs, added matrix and the coffee ring effect as compared to conventional MALDI; page S-5

Figure S-5: Example mass spectra from the analysis of low molecular weight compounds using AuNPs, added matrix and the coffee ring effect as compared to conventional MALDI; page S-6

Figure S-6: Optical images of conventional MALDI spots and AuNP assisted MALDI of bradykinin with added NaCl; page S-7

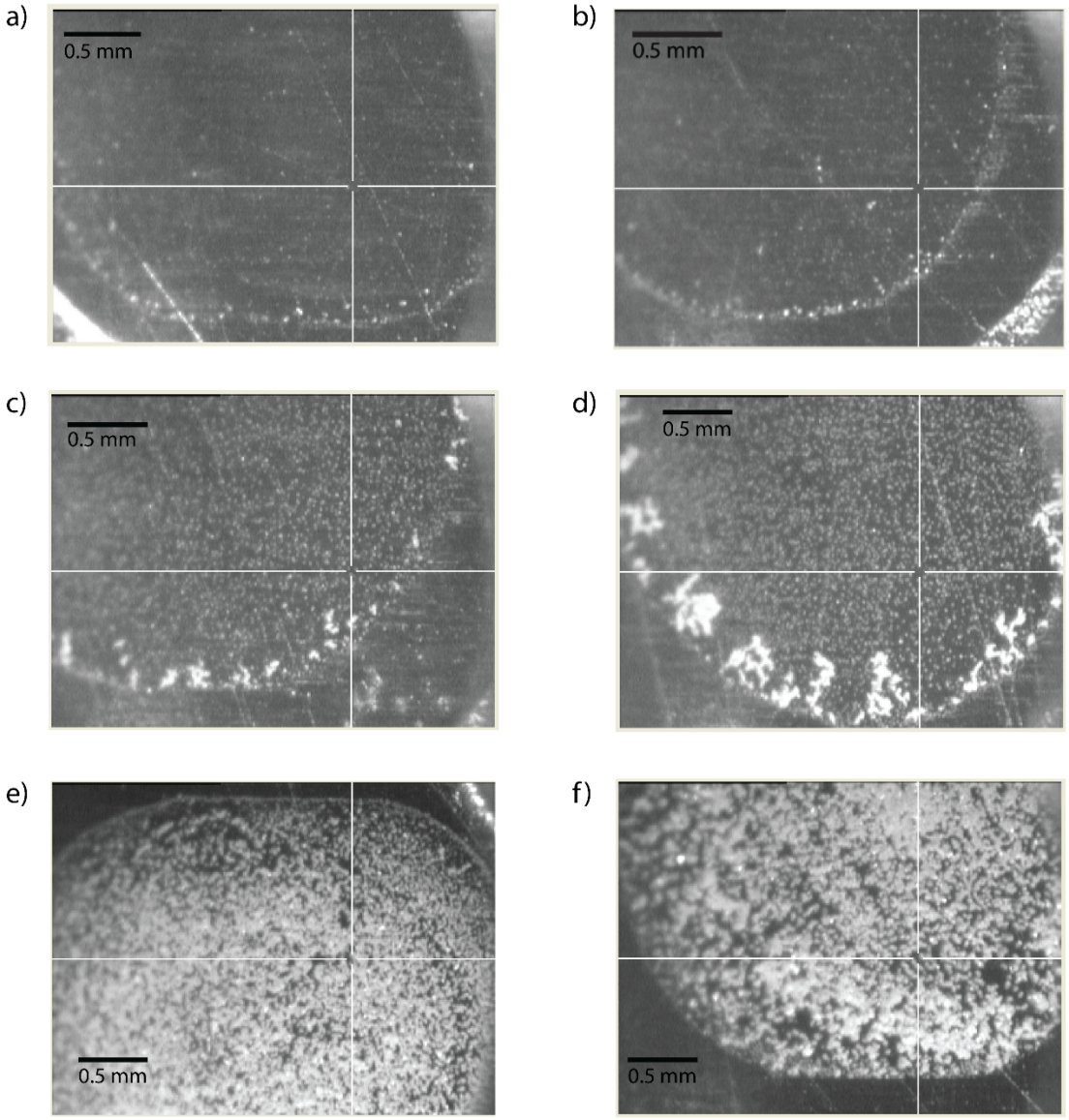


Figure S-1. Optical images of spots of 1 pmol AuNPs with 500 fmol bradykinin and varying CHCA concentrations; a) 0.25 mg/mL CHCA, b) 0.5 mg/mL CHCA, c) 1.25 mg/mL CHCA, d) 2.5 mg/mL CHCA, e) 7.5 mg/mL CHCA and f) 15 mg/mL CHCA.

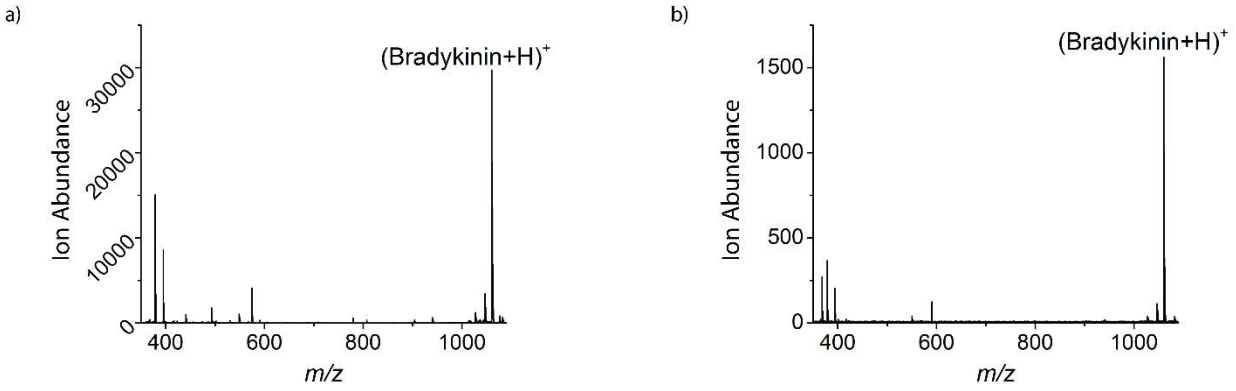


Figure S-2. a) 500 fmol bradykinin with 1 pmol TEGOH and 0.5 mg/mL CHCA, spectrum taken on the edge of the visible coffee ring formed as the sample droplet dried, b) 500 fmol bradykinin with 1 pmol TEGOH and 0.5 mg/mL CHCA, spectrum taken inside the coffee ring formed.

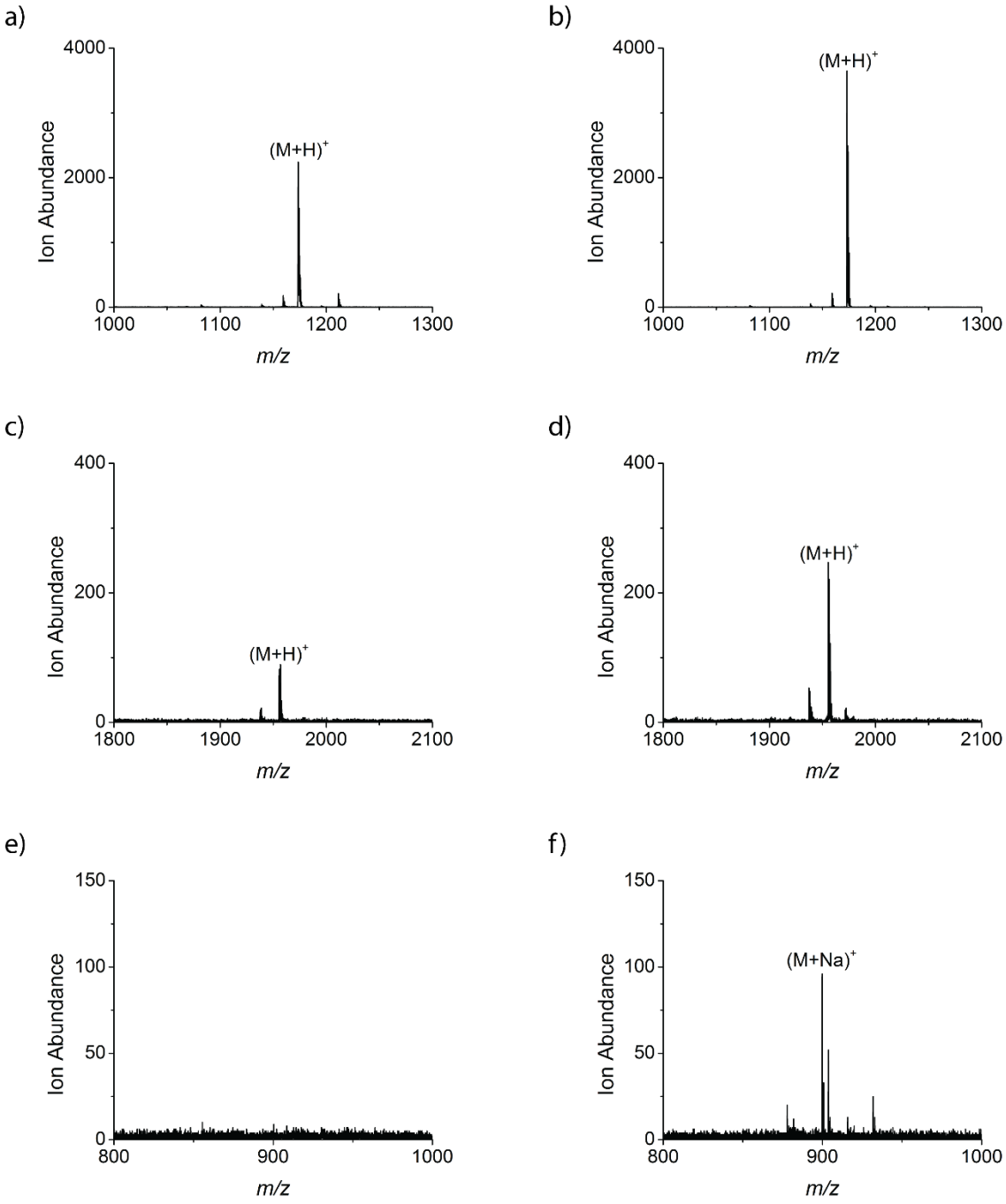


Figure S-3. a) 500 fmol kinetensin with 15 mg/mL CHCA; S/N is 250 ± 40, b) 500 fmol kinetensin with 100 fmol TEGOH and 0.5 mg/mL CHCA; S/N is 860 ± 40, c) 500 fmol preproenkephalin with 15 mg/mL CHCA; S/N is 13 ± 3, d) 500 fmol preproenkephalin with 100 fmol TEGOH and 0.5 mg/mL CHCA; S/N is 40 ± 4, e) 500 fmol spinorphin with 15 mg/mL CHCA, f) 500 fmol spinorphin with 100 fmol TEGOH and 0.5 mg/mL CHCA; S/N is 11 ± 1.

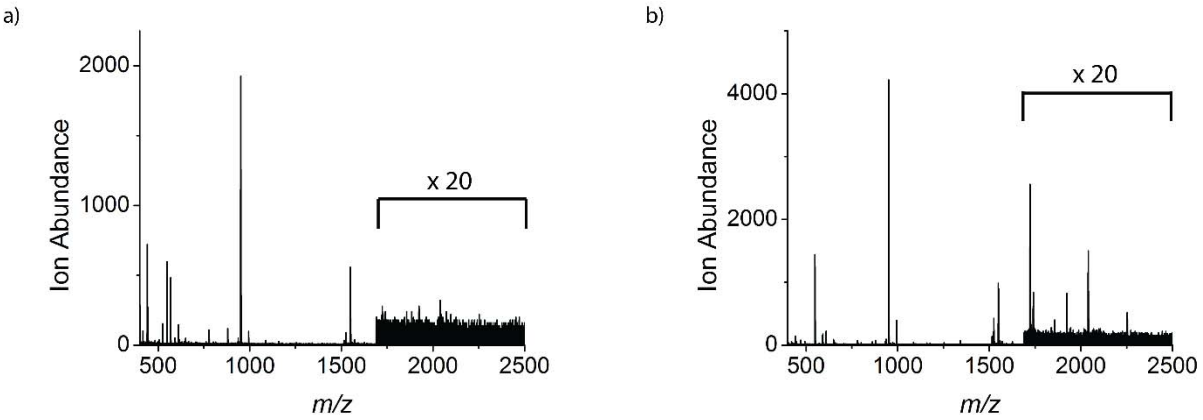


Figure S-4. a) 500 fmol myoglobin digest with 15 mg/mL CHCA, b) 500 fmol myoglobin digest with 1 pmol TEGOH AuNPs and 0.5 mg/mL CHCA.

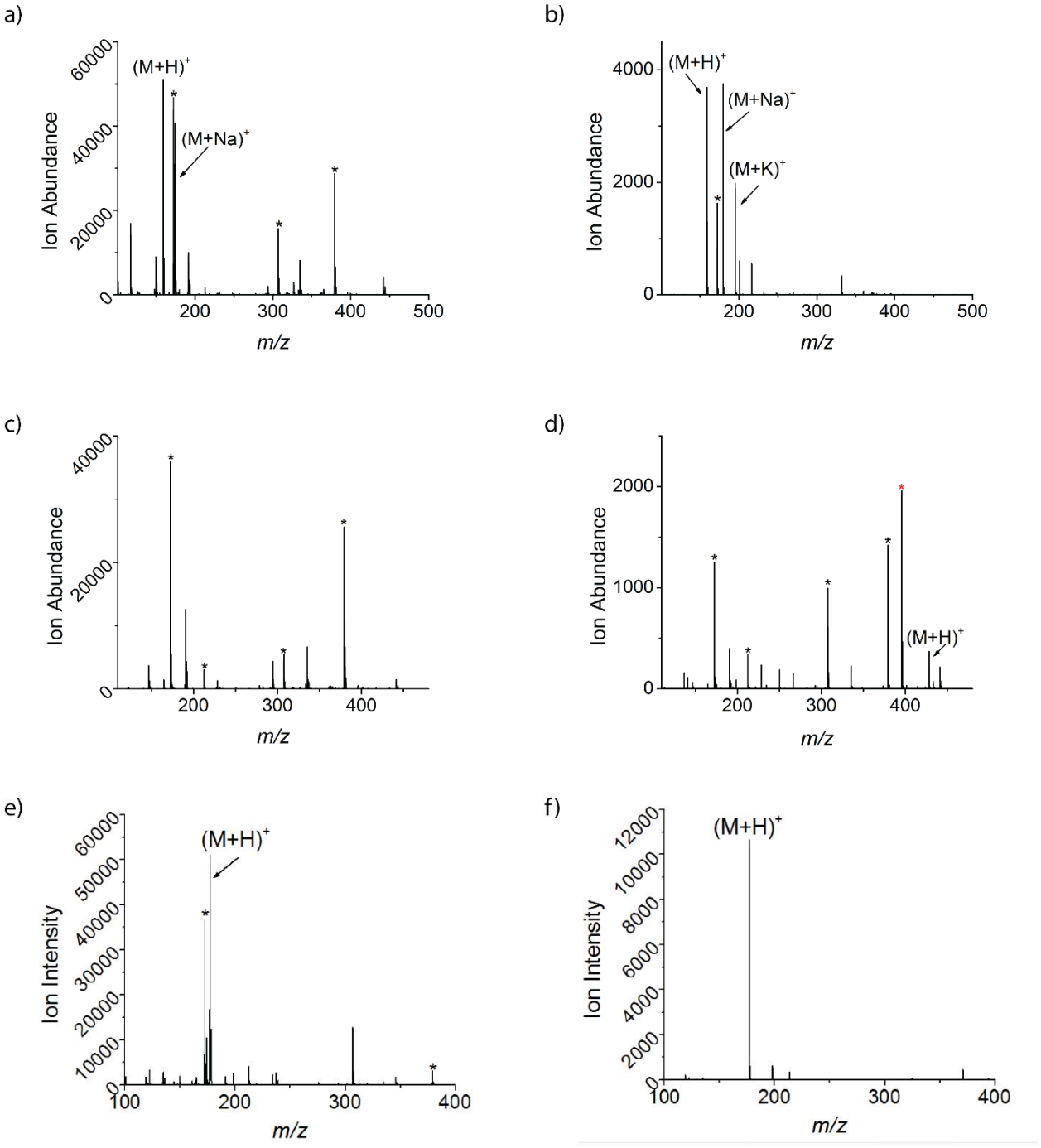
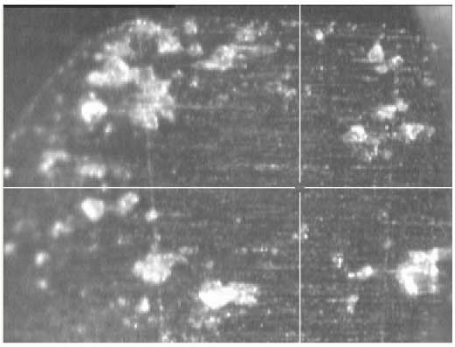


Figure S-5. a) 500 pmol histidine with 15 mg/mL CHCA, b) 500 pmol histidine with 1 pmol TEGOH and 0.5 mg/mL CHCA, c) 500 pmol adenosine-5'-diphosphate (ADP) with 15 mg/mL CHCA, d) 500 pmol adenosine-5'-diphosphate (ADP) with 1 pmol TEGOH and 0.5 mg/mL CHCA, e) 500 pmol arginine with 15 mg/mL CHCA, f) 500 pmol arginine with 1 pmol TEGOH and 0.5 mg/mL CHCA; black asterisks mark matrix peaks and red asterisks mark peaks from the TEGOH AuNPs.

a)



b)

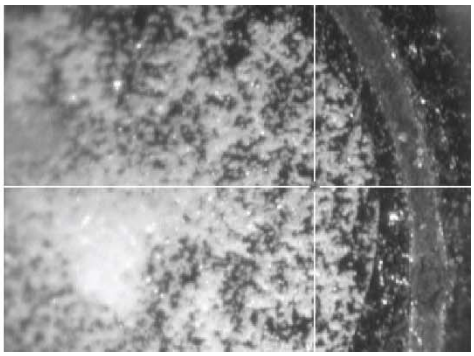


Figure S-6. a) Optical image of a sample spot of 500 fmol bradykinin, 1 pmol TEGOH AuNPs, 0.5 mg/mL CHCA, and 75 mM NaCl, b) Optical image of a sample spot of 500 fmol bradykinin, 15 mg/mL CHCA and 75 mM NaCl.