Supplementary Information (SI)

High power deep UV-LEDs for analytical optical instrumentation

Yan Li[a]‡, Miloš Dvořáka[a,b,c]‡, Pavel N. Nesterenko[a], Nantana Nuchtavorn[a,d], Mirek Macka[a]*

[a] School of Physical Sciences and Australian Centre for Research on Separation Science (ACROSS), University of Tasmania, Private Bag 75, Hobart 7001, Australia

[b] Institute of Food Science and Biotechnology, Faculty of Chemistry, Brno University of Technology, Purkyňova 118, 612 00 Brno, Czech Republic

[c] Institute of Analytical Chemistry, Academy of Sciences of the Czech Republic, Veveří 967/97, 602 00 Brno, Czech Republic

[d] Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Mahidol University, 447 Sri-Ayudhaya Rd., Rajathevee, Bangkok 10400, Thailand

*Corresponding author

Professor Mirek Macka, Private Bag 75, School of Physical Sciences and Australian Centre for Research on Separation Science, University of Tasmania, Hobart 7001, Australia

E-mail: Mirek.Macka@utas.edu.au

Phone: +61 362266670; Fax: +61 362262858

1. Photometric on-capillary detection study: sensitivity vs. absorbance curve and resulting effective pathlength and stray light

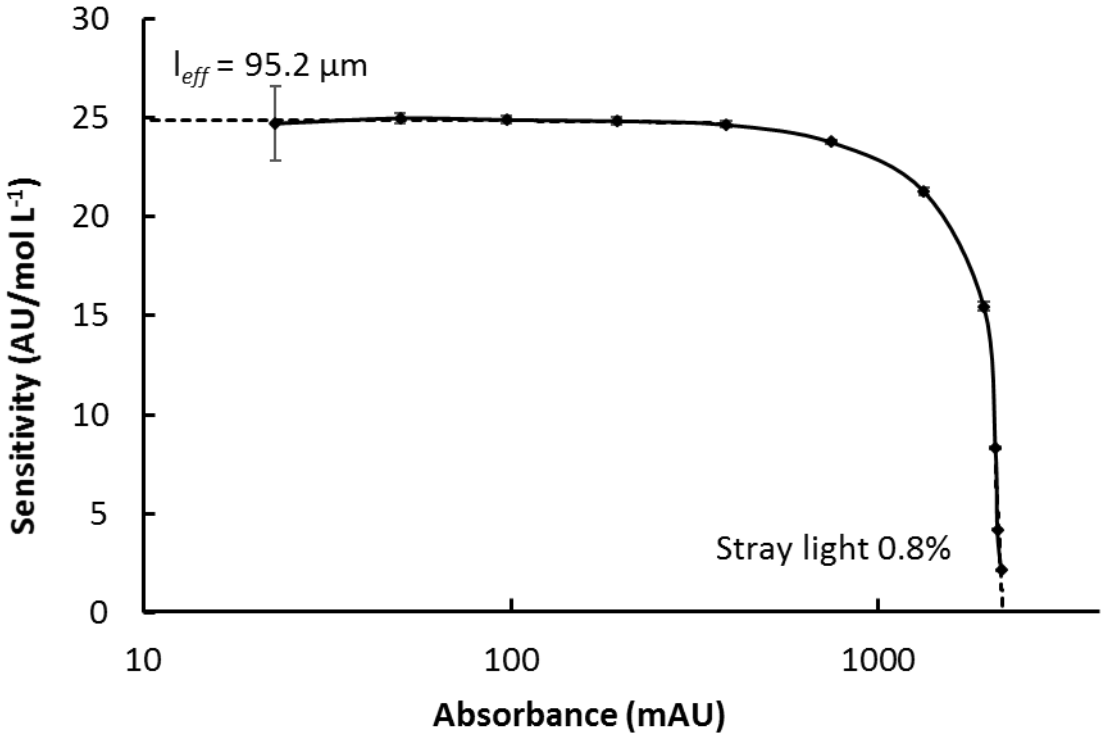

Fig. S1. Detection linearity as sensitivity vs. absorbance graph. Conditions: Capillary inner diameter (100 µm), test analyte chromate, effective pathlength (l_{eff} = 95.2 µm) calculated for sensitivity extrapolated to A=0 equal to 25 AU/mol L^{-1}, and chromate molar absorptivity coefficient =2624 L mol^{-1} cm^{-1} as measured. The stray light 0.8% from the extrapolated high-end of the curve at A = 2.178. An upper limit of detection (LOD), determined as the absorbance corresponding to 95% sensitivity, was calculated as 745 mAU.

2. The analyte spectra overlayed with the emission spectrum

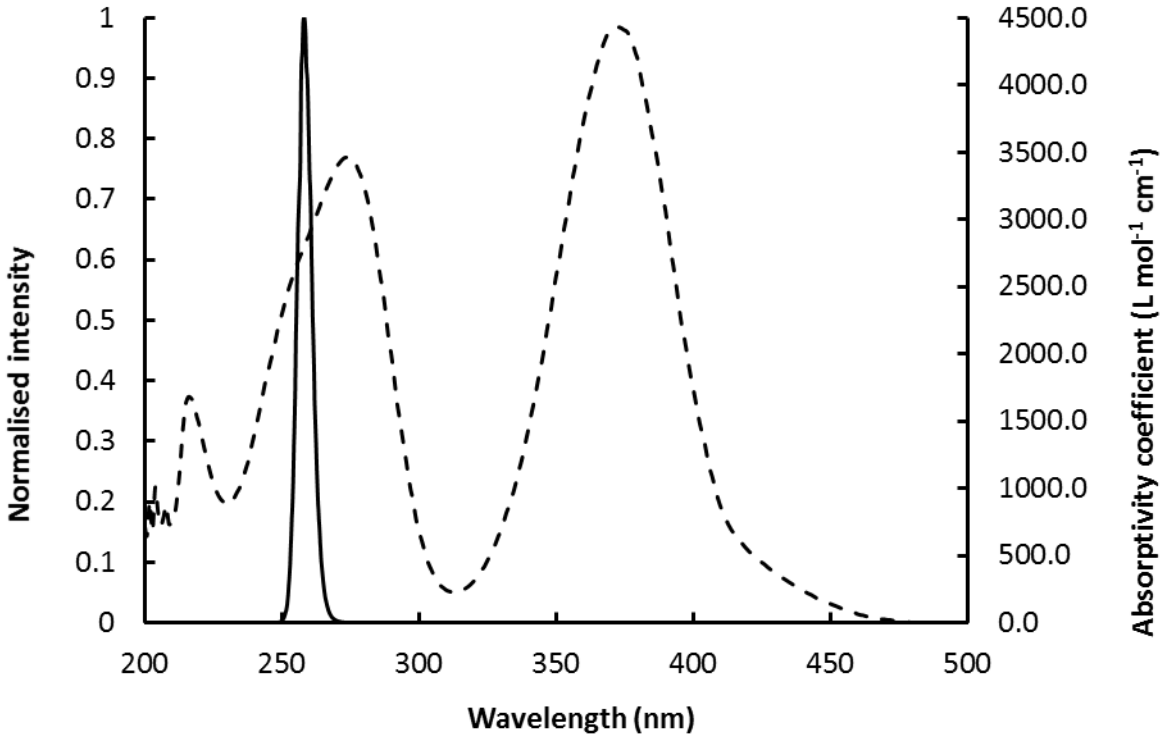

Fig. S2. Absorbance spectrum of chromate absorbing strongly at 255 nm overlayed with the 255 nm deep UV-LED emission spectrum.

3. Demonstration of detection performance

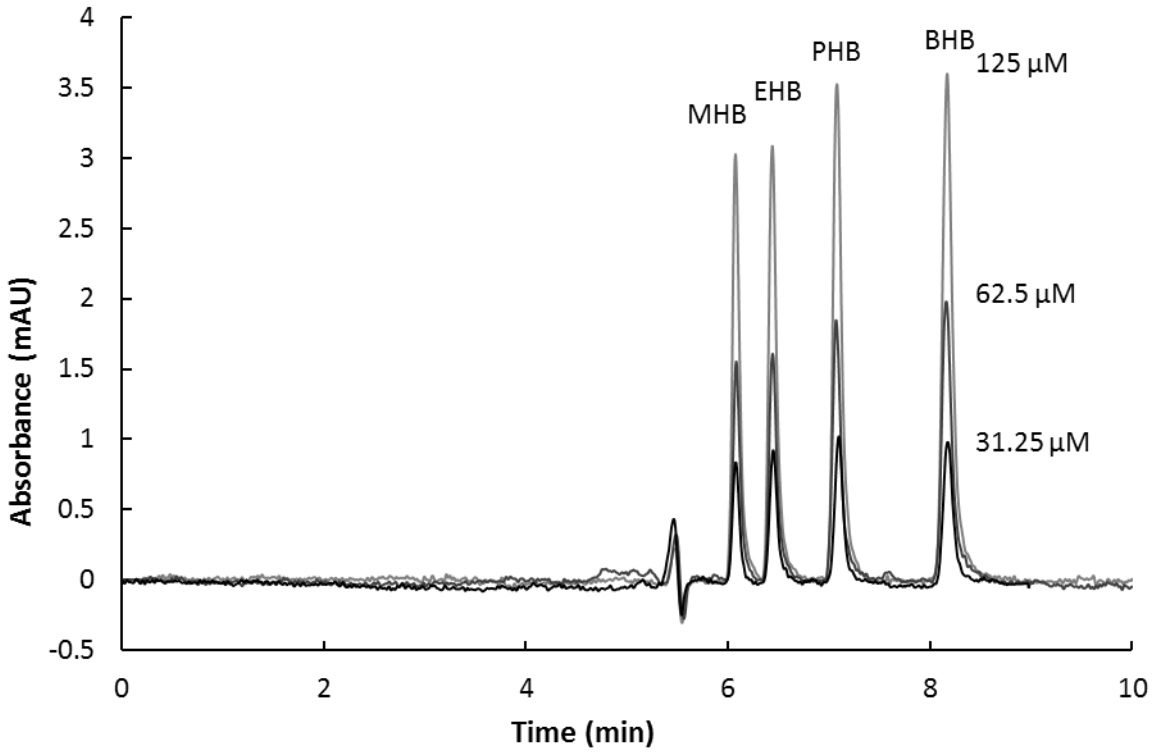

Fig. S3. Isocratic separation of parabens of different concentrations. Conditions: Concentration of all analytes in three separations was 31.25 µM, 62.5 µM or 125 µM. methyl 4-hydroxybenzoate (MHP), ethyl 4-hydroxybenzoate (EHB), mM propyl 4-hydroxybenzoate (PHB), and butyl 4-hydroxybenzoate (BHB); eluent: 50 mM ammonium acetate - acetonitrile 50/50 (v/v); flow rate: 0.5 mL min^{-1}; column: 30 cm × 100 µm i.d.; injection volume: 4 nL (sample injection length as in the on-capillary detector: 500 µm); detection: 255 nm LED on-capillary photometric detector, inserted capillary i.d. 100 µm, optical window width 50 µm. Deep UV-LED forward current 100 mA.