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Direct spectral analysis and determination of high content of carcinogenic bromine in bread using UV pulsed laser induced breakdown spectroscopy
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Abstract
ABSTRACT: Laser induced breakdown spectroscopy (LIBS) was applied for the detection of carcinogenic elements like bromine in four representative brands of loaf bread samples and the measured bromine concentrations were 352, 157, 451, and 311 ppm, using Br I (827.2 nm) atomic transition line as the finger print atomic transition. Our LIBS system is equipped with a pulsed laser of wavelength 266 nm with energy 25 mJ pulse−1, 8 ns pulse duration, 20 Hz repetition rate, and a gated ICCD camera. The LIBS system was calibrated with the standards of known concentrations in the sample (bread) matrix and such plot is linear in 20–500 ppm range. The capability of our system in terms of limit of detection and relative accuracy with respect to the standard inductively coupled plasma mass spectrometry (ICPMS) technique was evaluated and these values were 5.09 ppm and 0.01–0.05, respectively, which ensures the applicability of our system for Br trace level detection, and LIBS results are in excellent agreement with that of ICPMS results. © 2016 Taylor & Francis Group, LLC.

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