Highly sensitive sensing of food additives based on fluorescent carbon quantum dots

Carneiro, S.V.
Holanda, M.H.B.
Cunha, H.O.
Oliveira, J.J.P.
Pontes, S.M.A.
Cruz, A.A.C.
Fechine, L.M.U.D.
Moura, T.A.
Paschoal, A.R.
Zambelli, R.A.
Freire, R.M.
Fechine, P.B.A.

Abstract
A robust fluorescence-based sensing strategy was designed considering relevance of analyzing chemical additives in industrialized food. In this study, a sensing approach was developed using fluorescent carbon quantum dots (CQDs) as a chemometric tool. CQDs were synthesized by a simple one-step hydrothermal route using the American natural seed Caelsalpinia pulcherrima, and further characterized regarding their chemical structure. Five food additives were identified, citric acid, lactic acid, ascorbic acid, sodium benzoate and potassium sorbate, which showed a highly sensitive response with a limit of detection (LOD) as low as 252 ng mL^{-1}. The sensing platform was designed using the supervised method for recognizing patterns of linear discriminant analysis (LDA), where we could identify different concentrations of additives, after optimization of experimental parameters. Furthermore, the sensing strategy successfully identified all tested additives in a pickled olives sample with 95 % of confidence, where 100 % of combinations were correctly identified based on classification matrix. Overall, the obtained results evidence the accuracy and potential of CQDs-based fluorescence sensing in the identification of food additives.

Author keywords
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