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# $\beta$ -CYCLODEXTRIN COATED CdSe/ZnS QUANTUM DOTS FOR VANILLIN SENSING IN FOOD SAMPLES

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## Abstract

An optical sensor for vanillin in food samples using CdSe/ZnS quantum dots (QDs) modified with  $\beta$ -cyclodextrin ( $\beta$ -CD) was developed. This vanillin-sensor is based on the selective host-guest interaction between vanillin and  $\beta$ -cyclodextrin. The procedure for the synthesis of  $\beta$ -cyclodextrin-CdSe/ZnS ( $\beta$ -CD-CdSe/ZnS-QDs) complex was optimized, and its fluorescent characteristics are reported. It was found that the interaction between vanillin and  $\beta$ -CD-CdSe/ZnS-QDs complex produced the quenching of the original fluorescence of  $\beta$ -CD-CdSe/ZnS-QDs according to the Stern-Volmer equation. The mechanism of the interaction is discussed. The analytical potential of this sensing system was demonstrated by the determination of vanillin in synthetic and food samples. The method was selective for vanillin, with a limit of detection of  $0.99 \mu\text{g mL}^{-1}$ , and a reproducibility of 4.1% in terms of relative standard deviation (1.2% under repeatability conditions). Recovery values were in the 90-105% range for food samples.

**Keywords:** CdSe/ZnS quantum dots,  $\beta$ -cyclodextrin; Functionalization; Fluorescence; Vanillin sensing; Food samples.

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