SERRS ANALYSIS OF TWO STRUCTURALLY RELATED TRIARYL DYES: VICTORIA BLUE B AND VICTORIA BLUE BO

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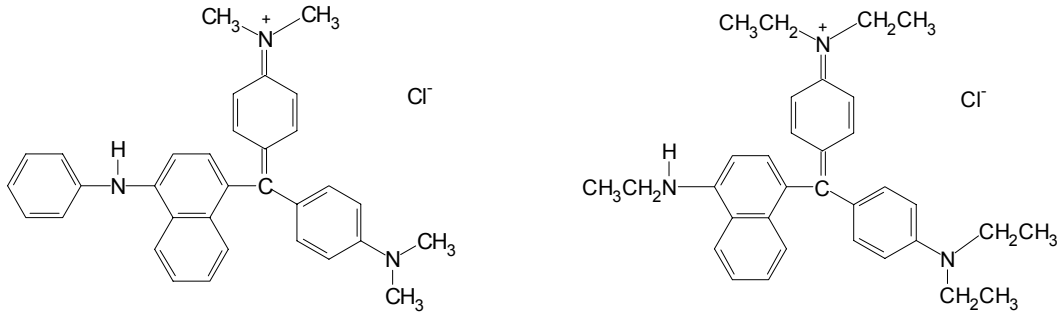
Abstract: The SERRS spectra of two structurally closely related dyes, Victoria blue B and Victoria blue BO, have been examined. The usefulness of SERRS as an analytical technique for distinguishing the two dyes and for semi-quantitative analysis is discussed.

Victoria blue B and Victoria blue BO are cationic diphenylnaphthylmethane dyes which exhibit antimicrobial activity [1]. Victoria blue BO is being investigated as a photosensitizing agent for experimental photodynamic therapy of cancer *in vitro* [2]. The dyes have also been used as analytical reagents [3] and for a variety of technological applications e.g. as textile dyes, biological stains, food colorants etc [4].

The two dyes have been investigated using surface enhanced resonance Raman spectroscopic (SERRS) to determine both the sensitivity of the technique for trace analysis and to differentiate between the two structurally related molecules (Fig.1). For the foregoing purposes a silver sol, prepared via a modified Lee-Meisel procedure [5, 6], was used as a SERRS substrate.



(I) **(II)**

Fig. 1. Schematic chemical structures of the dyes (**I**) Victoria blue B and (**II**) Victoria blue BO.

Fig. 2 shows the SERRS spectra for the two dye molecules using a laser exciting wavelength equal to 632.8 nm It is immediately obvious, from the representative spectra shown, that the two spectra are different. It is therefore possible to differentiate between the two molecules, Victoria blue B and BO, by employing SERRS. The most notable changes in the spectra are indicated by dashed lines. Fig. 3 shows a plot of log [Victoria blue] *vs* SERRS intensity indicating that SERRS can be used for semi-quantitative analysis of the dye (a similar plot has been obtained for Victoria blue B).

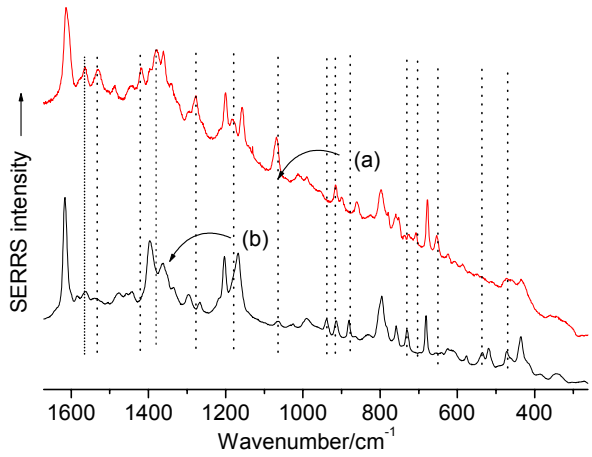


Fig. 2. Representative SERRS spectra of the dyes: (a) Victoria blue BO and (b) Victoria blue B.

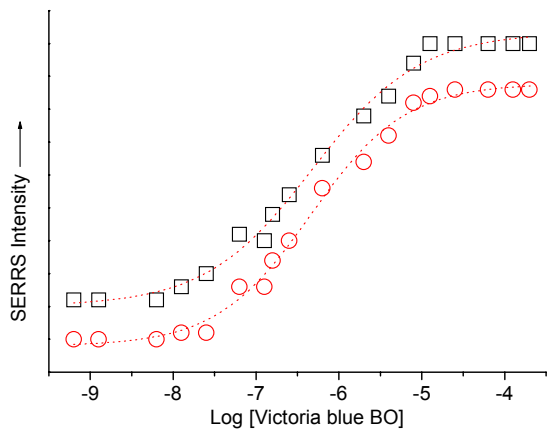


Fig. 3. Sensitivity of the SERRS technique in investigations of Victoria blue BO. □ and o represent the 1613 and 1068 cm^{-1} vibrational bands of the dye.

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