Supporting Information

pH-Stabilized Polydiacetylenes through Sodium Dodecyl Benzenesulfonate Doping: Its Application in Dopamine Sensing

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1. The colorimetric response of PCDA:surfactant towards NaOH

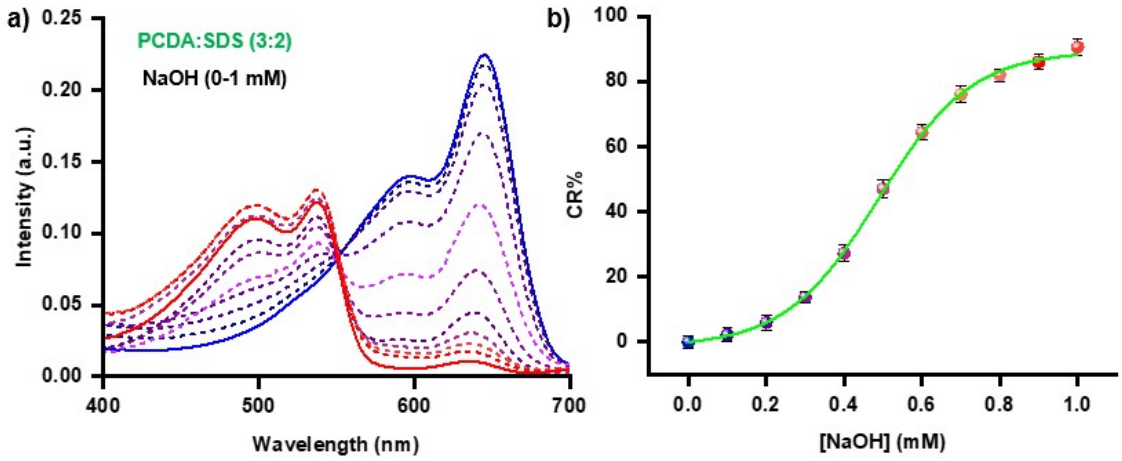


Figure S1. The changes in the UV-Vis a) absorbance band and b) corresponding colorimetric response of PCDA:SDS (3:2).

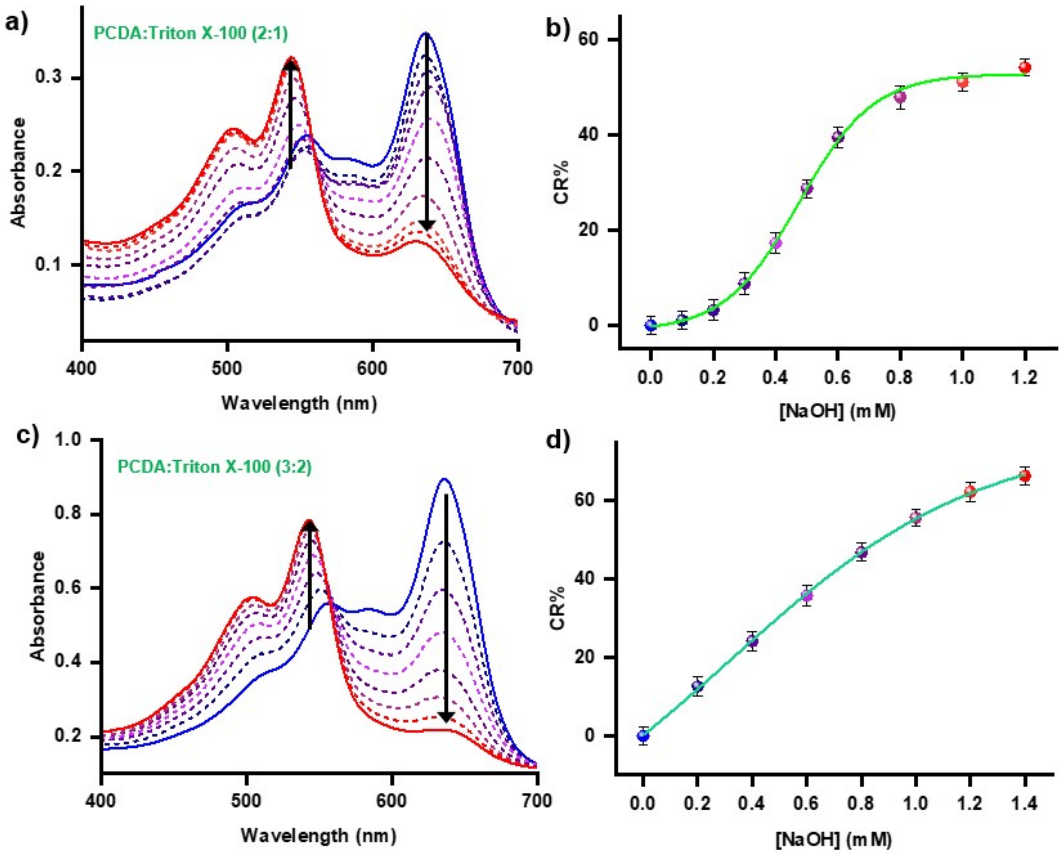


Figure S2. The a) and c) UV-Vis response and b) and d) corresponding colorimetric response of PCDA:Triton X-100 (2:1 and 3:2, respectively).

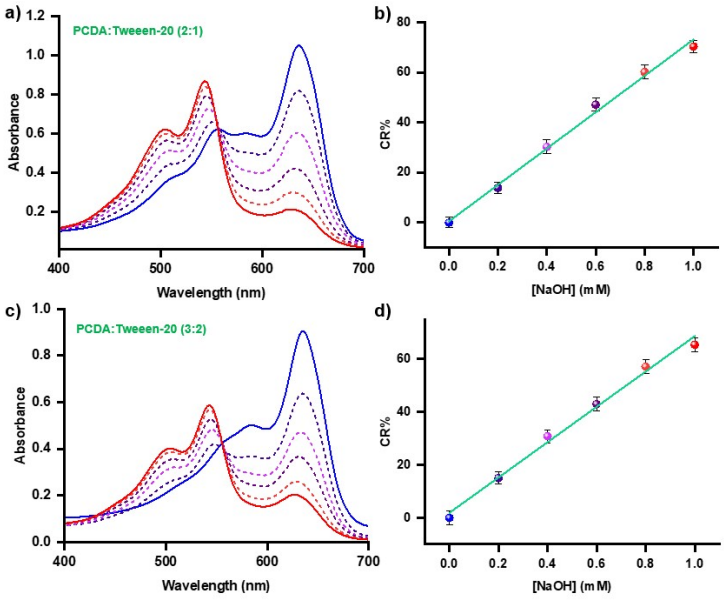


Figure S3. The a) and c) UV-Vis response and b) and d) corresponding colorimetric response of PCDA:Tween-20 (2:1 and 3:2, respectively).

2. The UV-Vis response of PCDA:SDBS towards NaOH

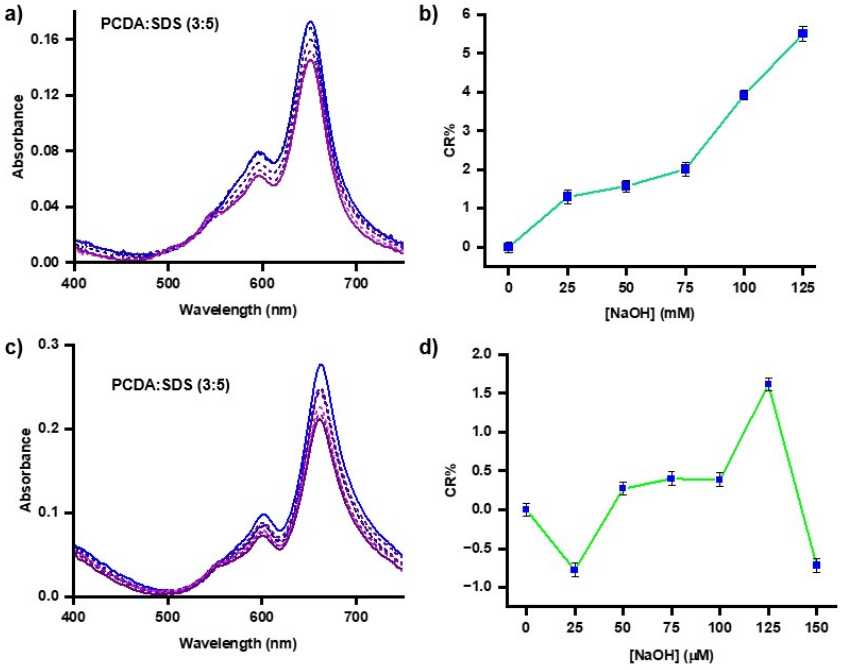


Figure S4. The a) and c) UV-Vis response and b) and d) corresponding colorimetric response of PCDA:SDBS (3:2 and 3:5, respectively) displaying enhanced stability against NaOH addition, a well-known stimulant of polydiacetylenes.

3. pH responsiveness study

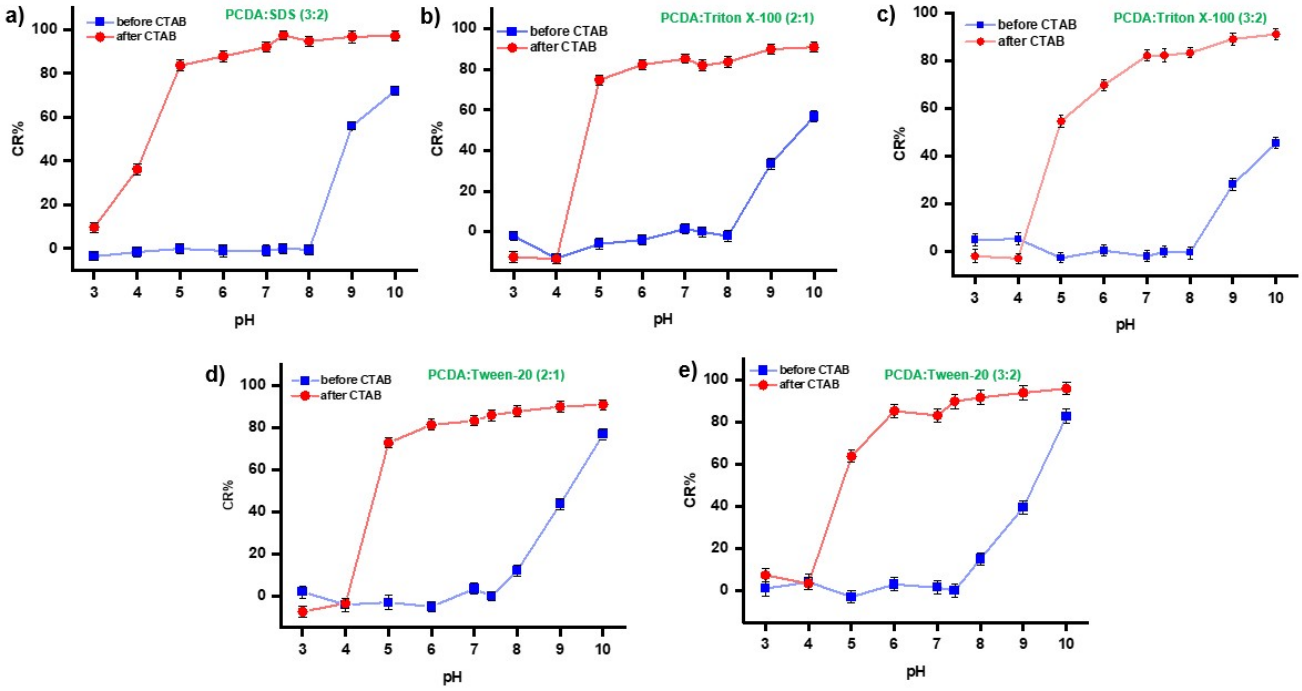


Figure S5. The colorimetric response of a) PCDA:SDS (3:2), b) PCDA:Triton X-100 (2:1), c) PCDA:Triton X-100 (3:2), d) PCDA:Tween-20 (2:1), and e) PCDA:Tween-20 (3:2) towards CTAB in varying pH. The results are in agreement with previous reports, where polydiacetylenes display chromatic change in basic pH without any other stimulus

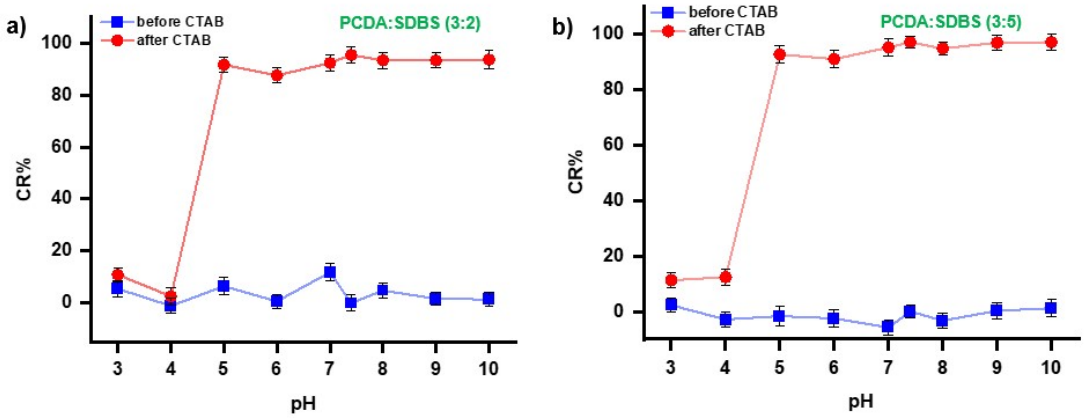
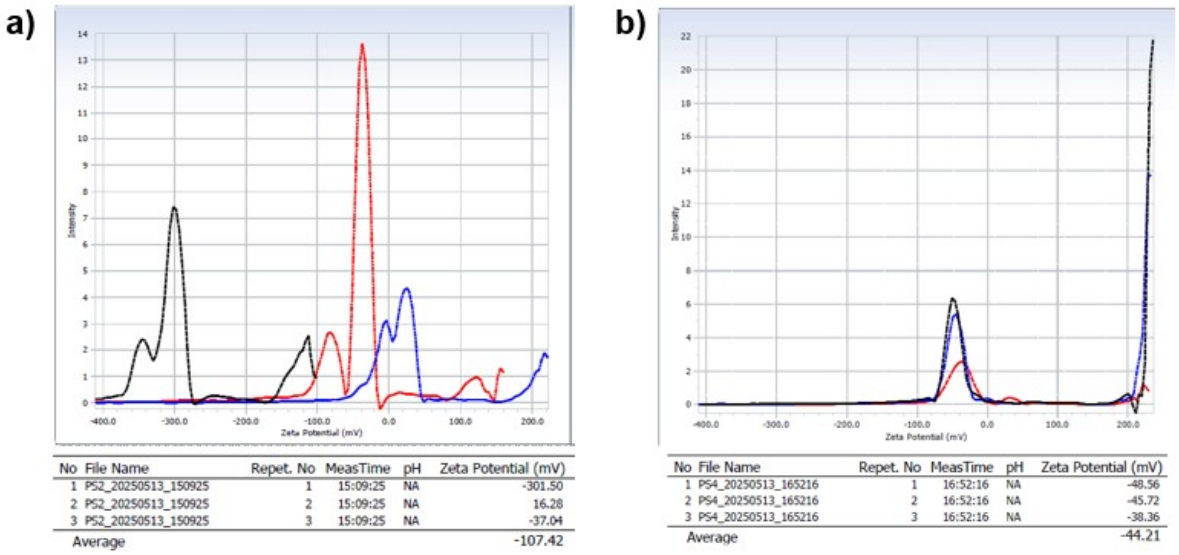


Figure S6. The colorimetric response of a) PCDA:SDBS (3:2), and b) PCDA:SDBS (3:2), (3:5) towards CTAB in varying pH.

4. Zeta potential studies



No	File Name	Repet. No	MeasTime	pH	Zeta Potential (mV)
1	PS2_20250513_150925	1	15:09:25	NA	-301.50
2	PS2_20250513_150925	2	15:09:25	NA	16.28
3	PS2_20250513_150925	3	15:09:25	NA	-37.04
Average					-107.42

No	File Name	Repet. No	MeasTime	pH	Zeta Potential (mV)
1	PS4_20250513_165216	1	16:52:16	NA	-48.56
2	PS4_20250513_165216	2	16:52:16	NA	-45.72
3	PS4_20250513_165216	3	16:52:16	NA	-38.36
Average					-44.21

Figure S7. Zeta potential of a) PCDA:SDSBS and b) PCDA self-assembly displaying an increase in the negative nature of the self-assembly. This increased negative nature may possibly interfere with the H-abstraction process, leading to stability in basic pH.

5. Buffer study of PCDA:SDBS

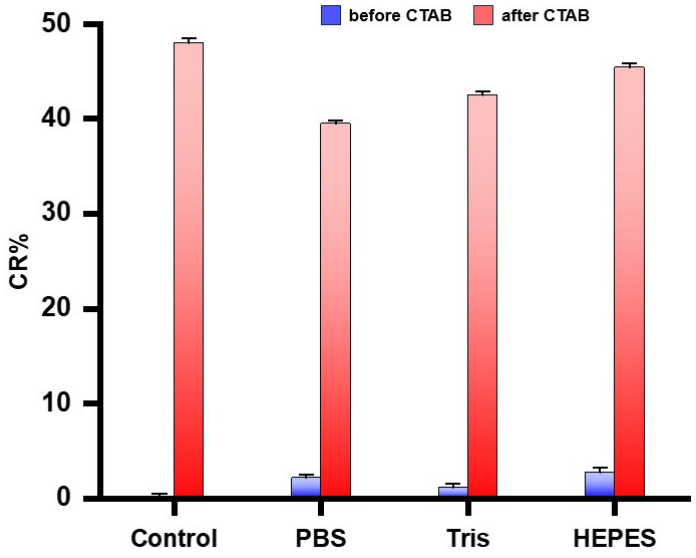


Figure S8. The colorimetric response of PCDA:SDBS in varying buffers at physiological pH. The results indicate the change in buffer system does not affect the polydiacetylene sensitivity.

6. Response of PCDA:SDBS towards common cations, anions and biogenic polyamines

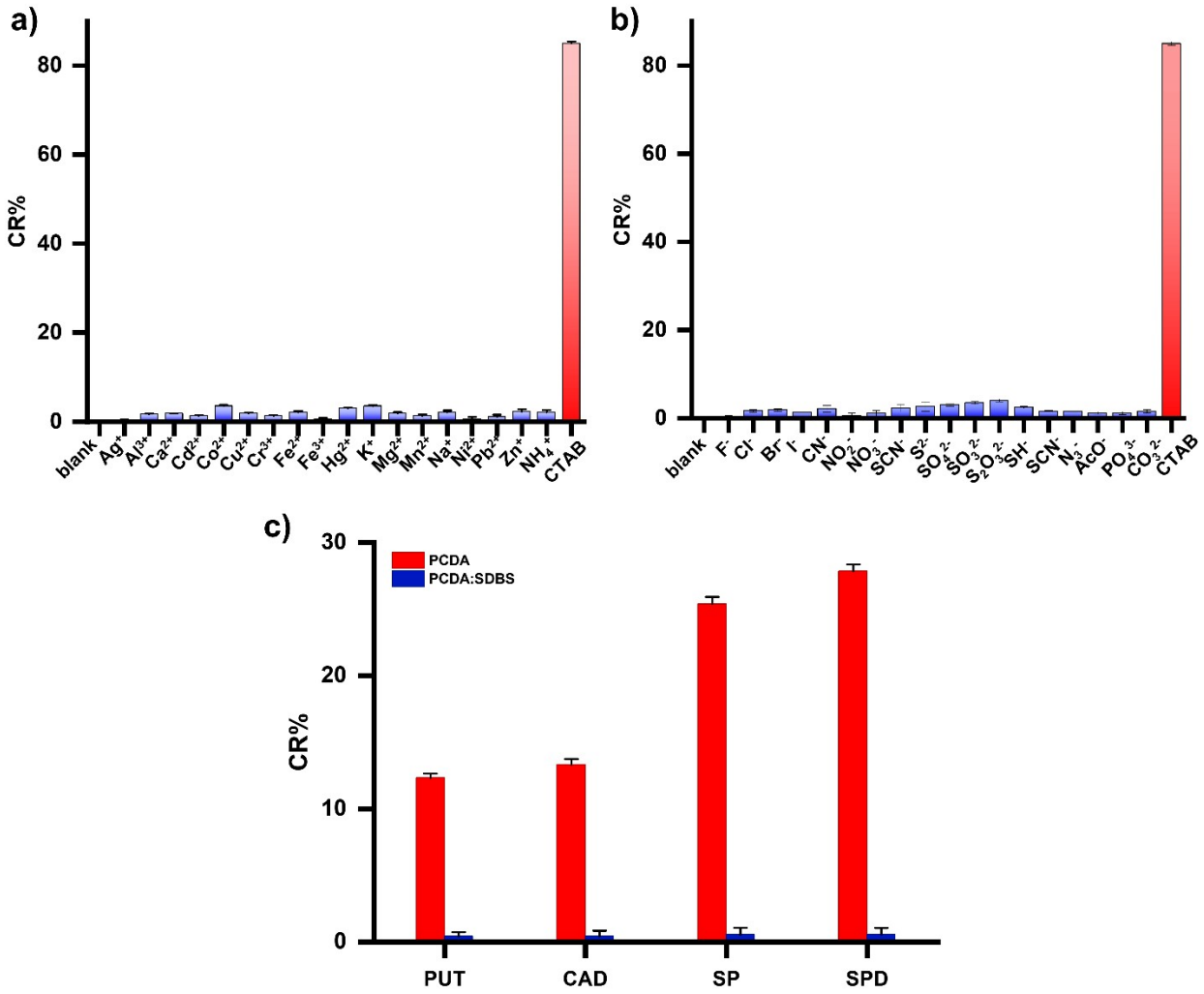


Figure S9. The colorimetric response of PCDA:SDBS towards common a) cations and b) anions, c) biogenic polyamines, indicating its stability in ionic environments and unresponsiveness to biogenic polyamine stimuli.

7. Thermal stability study

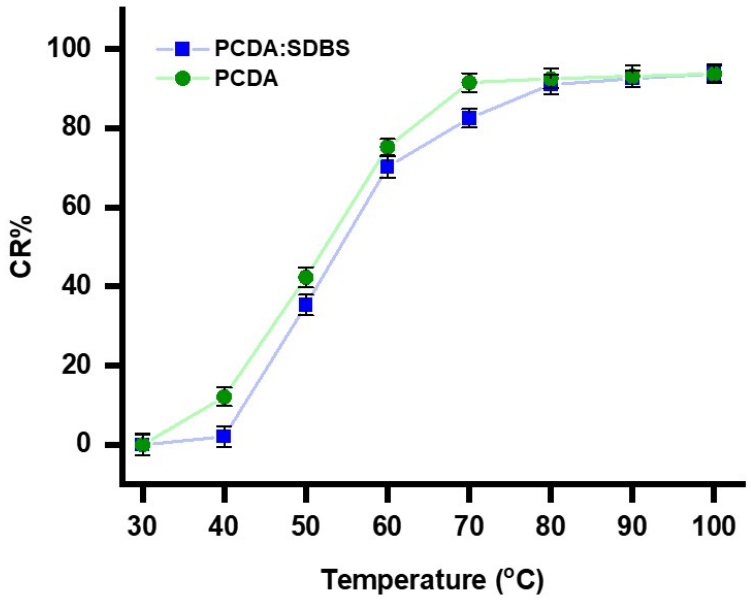


Figure S10. The thermal stability of PCDA:SDBS and PCDA displaying a typical blue-to-red change with more than 80% colorimetric response above 60 °C. PCDA:SDBS displays slightly better thermal stability than PCDA.

8. The response of PCDA:SDBS (3:5) upon the addition of CTAB

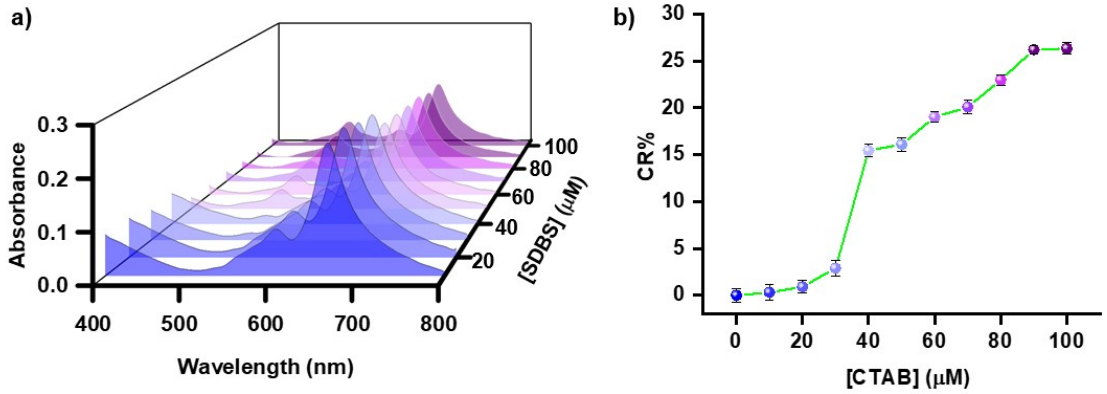


Figure S11. The change in (a) absorption band and (b) colorimetric response of varying ratios of PCDA:SDBS (3:5) upon the addition of CTAB. The 3:5 formulation with higher surfactant concentration loses one-third of its sensitivity, with the CR% lowering to 30%.

9. The UV-Vis response of PCDA:surfactant solution towards CTAB

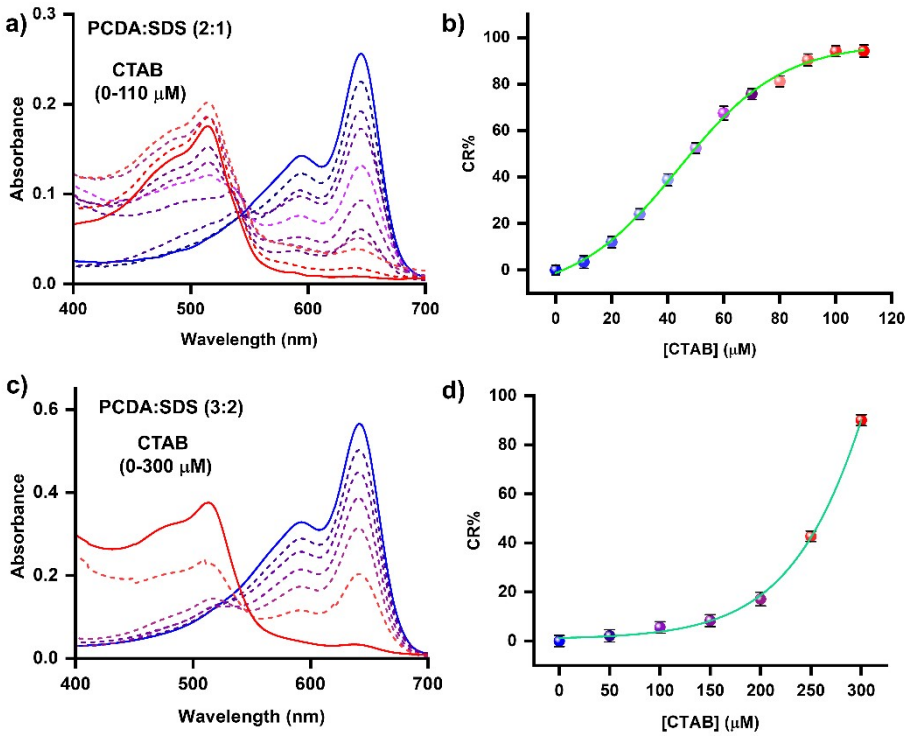


Figure S12. The change in (a), (c) absorbance and (b), (d) colorimetric response of PCDA:SDS (2:1 and 3:2, respectively) upon the addition of CTAB. An increase in the surfactant concentration leads to a decrease in the sensitivity of polydiacetylene.

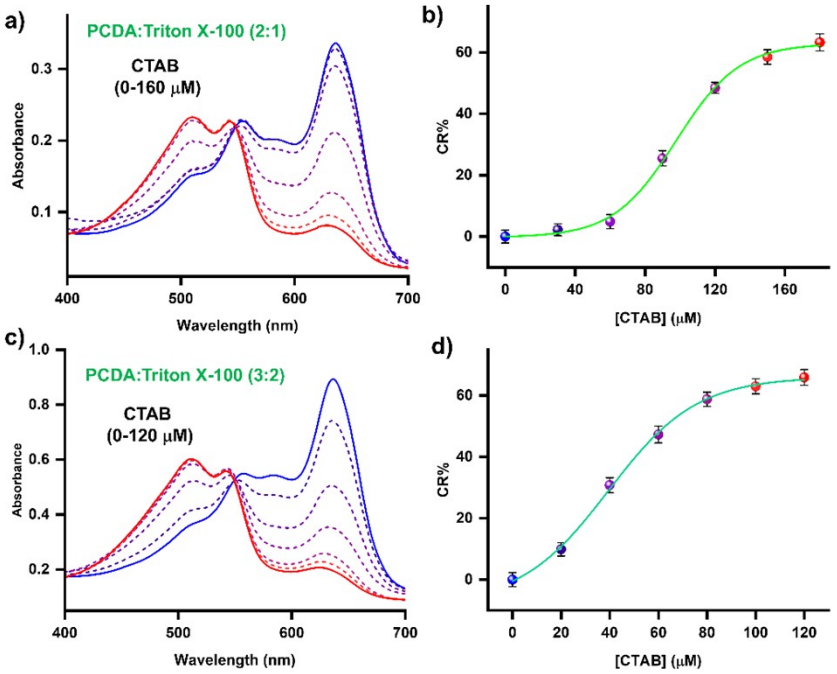


Figure S13. The change in (a), (c) absorbance and (b), (d) colorimetric response of PCDA:Triton X-100 (2:1 and 3:2, respectively) upon the addition of CTAB. Similar to that of the SDS, the increase in surfactant concentration leads to a decrease in the sensitivity of polydiacetylene.

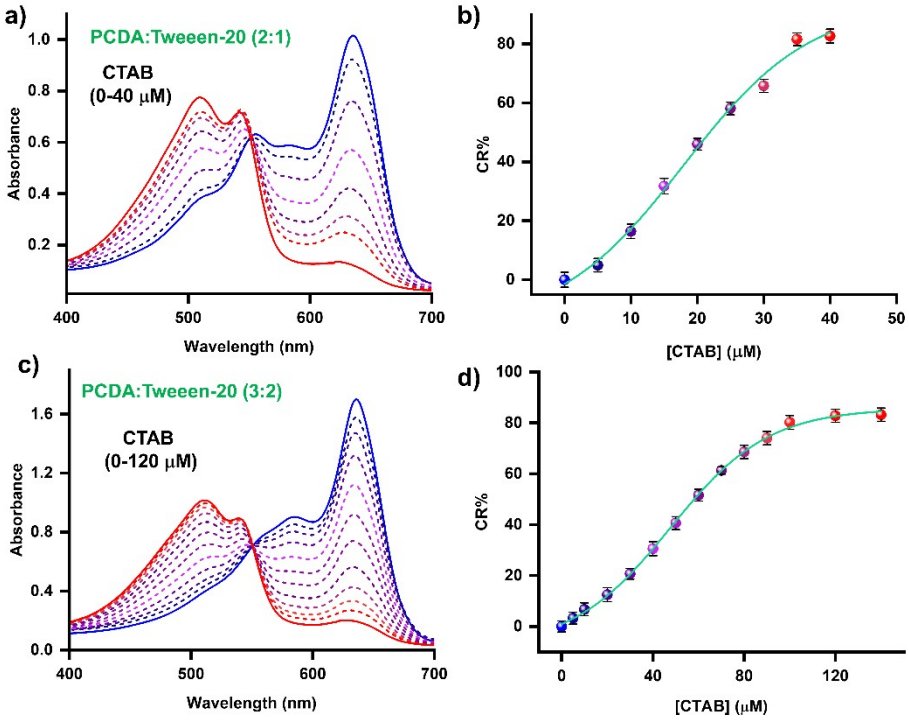


Figure S14. The change in (a), (c) absorbance and (b), (d) colorimetric response of PCDA:Tween-20 (2:1 and 3:2, respectively) upon the addition of CTAB. Upon incorporation of Tween-20, the sensitivity of polydiacetylene increased considerably, with the colorimetric response reaching 80% with 40 μM CTAB addition.