

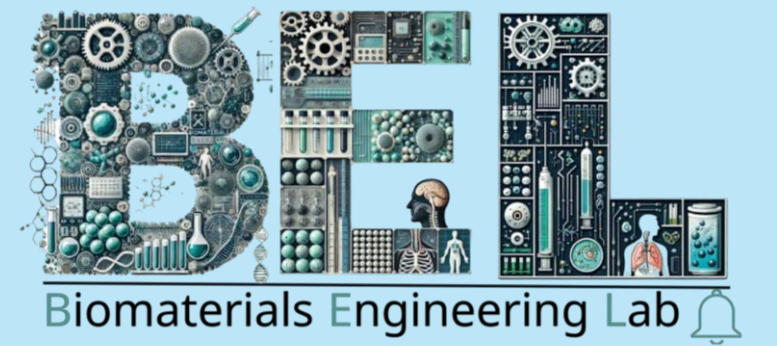


Vapor Responsive Programmable Thin Films

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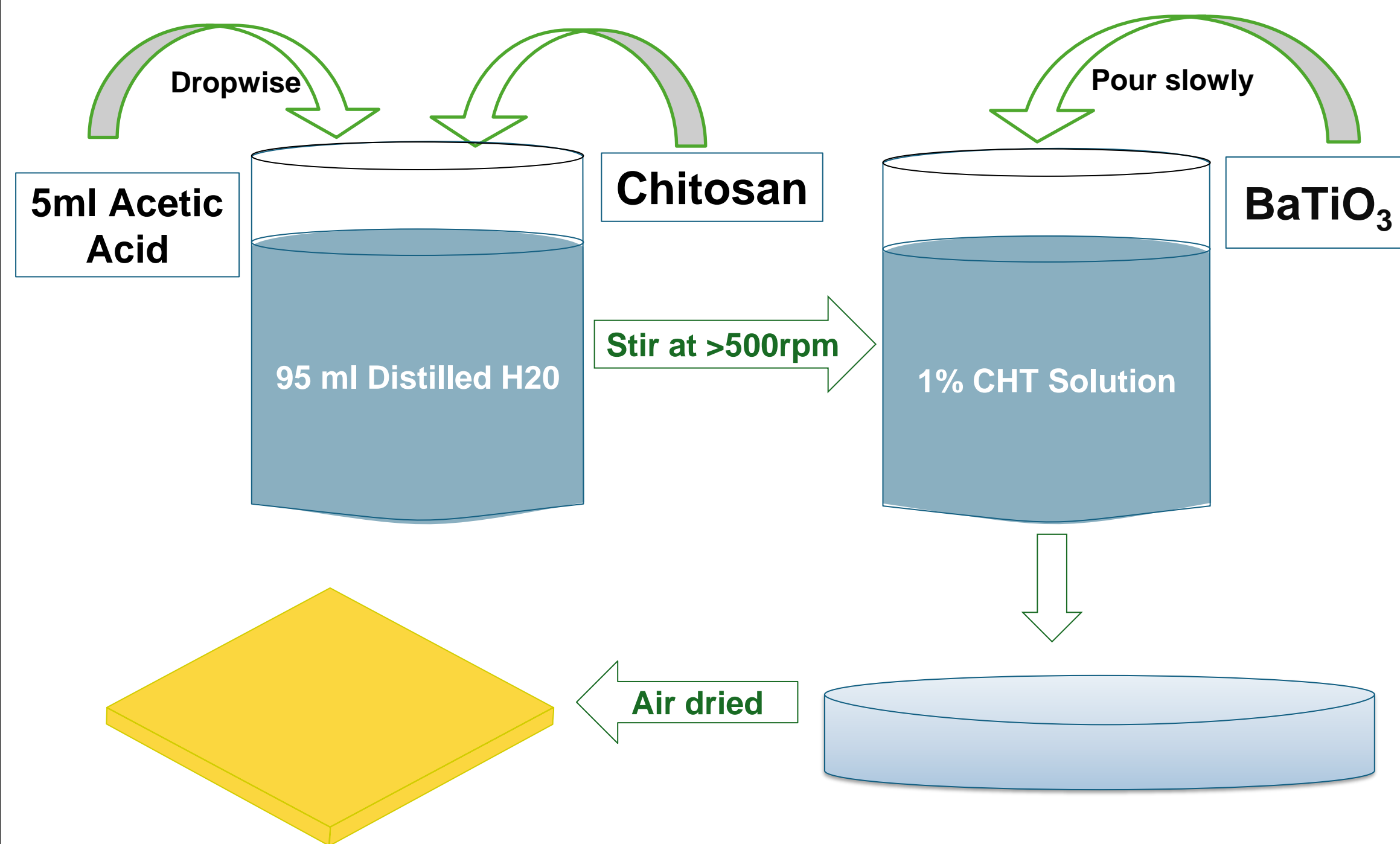
OBJECTIVE

To exploit shape morphing behaviour in Chitosan (CHT) based thin films and develop a water vapor responsive smart switch

INTRODUCTION

- Chitosan (CHT), stands out for its shape-morphing capabilities, biocompatibility, and environmental sustainability.
- CHT films were fabricated via the solvent casting and examined for their response to water vapor across various dimensions.
- A significant difference in bending behaviour was observed upon adding BaTiO₃ as a nanofiller in CHT matrix.
- The bending angle was calculated which can be correlated with conc. of the stimulus.
- The findings opens the potential in developing sustainable smart visual sensors for smoke detection system and environment monitoring.

EXPERIMENTAL SECTION



KEY POINTS

- 5% V/V Acetic Acid Solution
- CHT-BTO Solution preparation
- Solvent Casting
- Aspect Ratio: 6.5 (20*3 mm)

Sample	CHT:BTO	Thickness
CHT_0	1:0	0.12
CHT_BTO_0.1	1:0.1	0.11
CHT_BTO_0.3	1:0.3	0.12
CHT_BTO_0.5	1:0.5	0.10

RESULTS AND DISCUSSION



- Water Vapours at 70 °C
- Bending angle calculation

RESULTS AND DISCUSSION

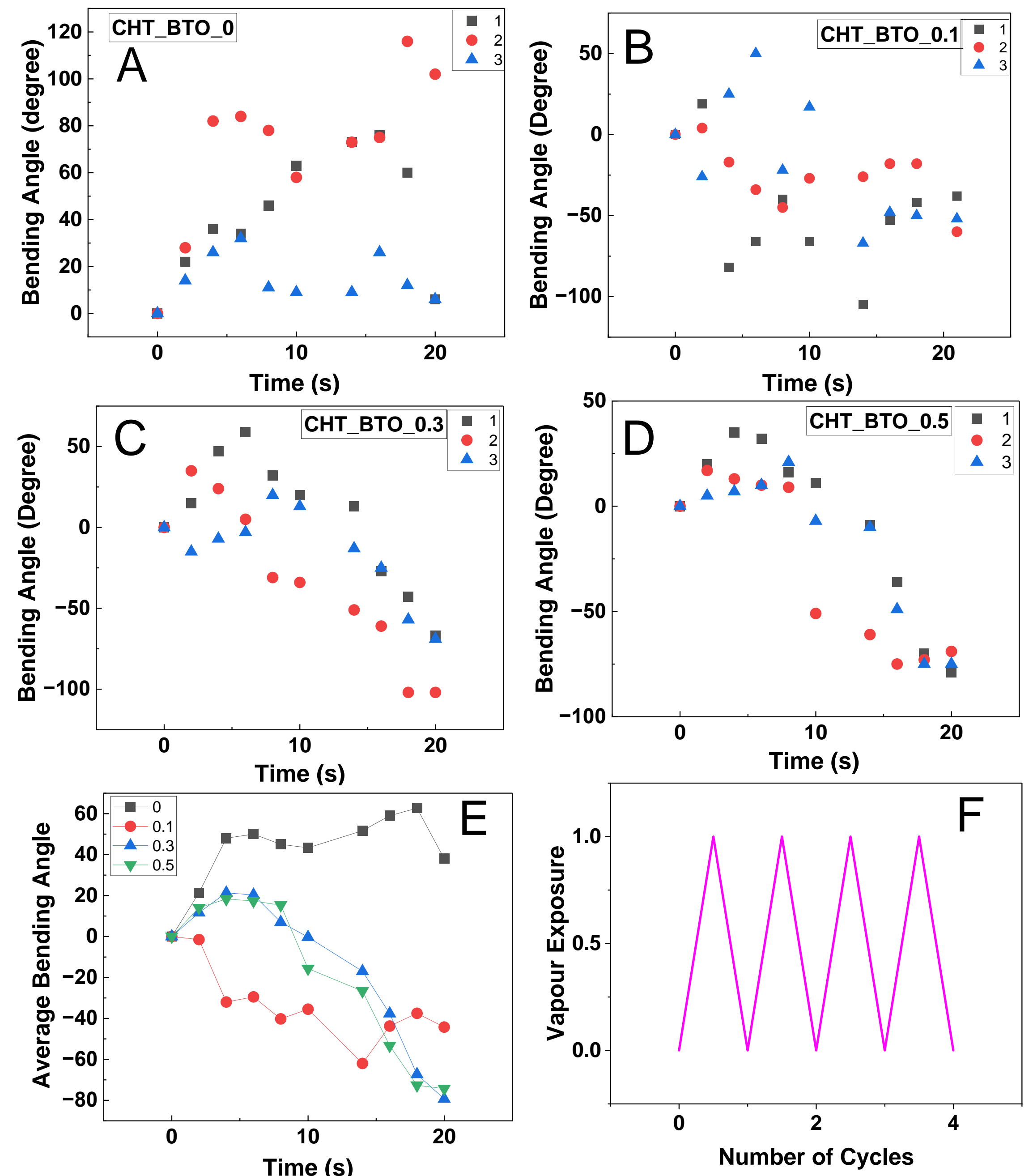
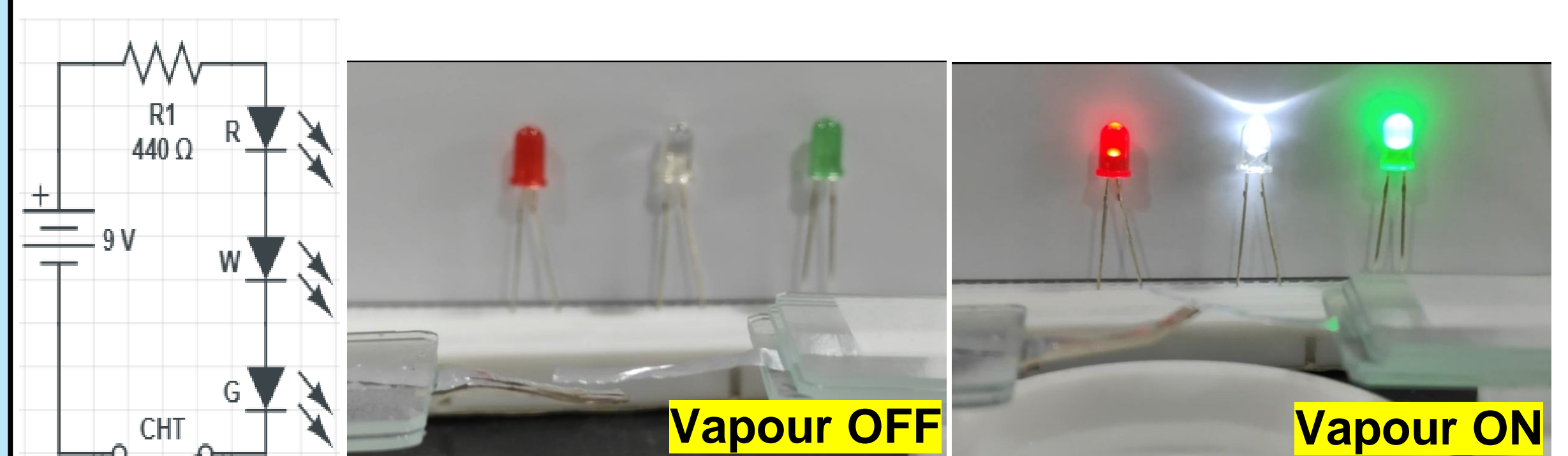


Fig. A-D shows the range of Bending Behaviour of CHT_BTO films; Fig. E shows the comparison of shape morphing behaviour among various conc. of BaTiO₃
Fig. F shows the repeatability of Smart switch after 30 mins time intervals

VAPOUR BASED SMART SWITCH



CONCLUSION

- BaTiO₃ induces significant shift in chitosan film shape morphing behaviour in response to water vapour.
- CHT films holds great potential as a sustainable smart material fire alarm systems and humidity sensor.

REFERENCES

- Ding et al. **2021**, *Adv. Sci.* DOI: 10.1002/adv.202004616
- Huang et al. **2021**, *Research.* DOI: 10.34133/2021/9786128

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