

Fondúireacht Eolaíochta Éireann  
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# Phosphonium Dicyanamide Ionogel Incorporating Bromophenol Blue Dye as a Versatile Platform for Monitoring pH in Solution



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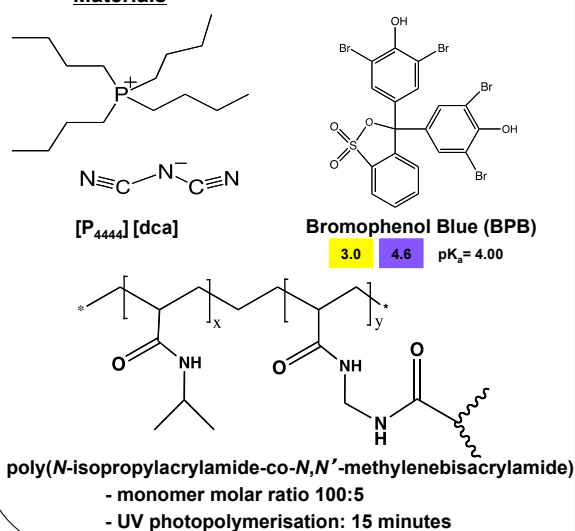
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## Introduction

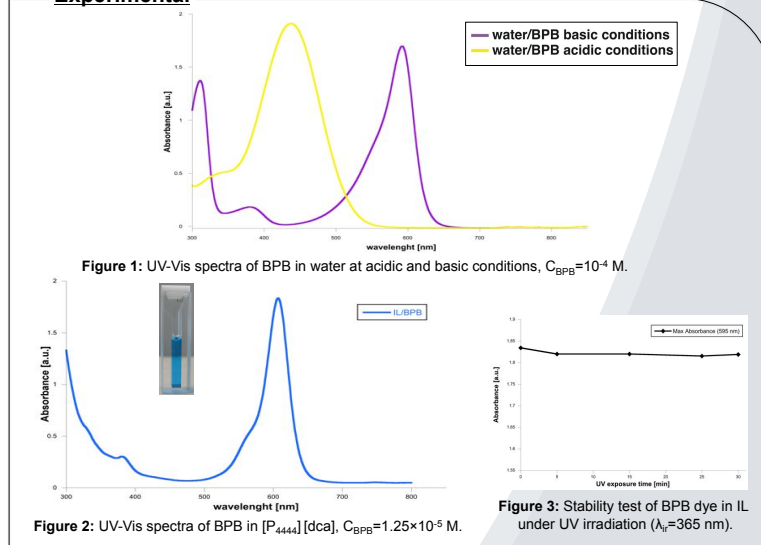
Online monitoring of pH levels in different environments such as bio-engineering and chemistry is vital for an effective control of many critical industrial processes.<sup>1</sup> An increasing interest has been reported in the fabrication of robust, cheap and versatile pH sensing materials that can be easily integrated within existing industrial technologies.<sup>2</sup>

In our laboratories we have previously demonstrated that ionogels integrating pH sensitive dyes are solid, flexible and easy to pattern materials that can perform continuous measuring of pH during chemical or biological processes.<sup>3</sup>

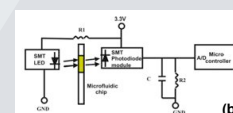
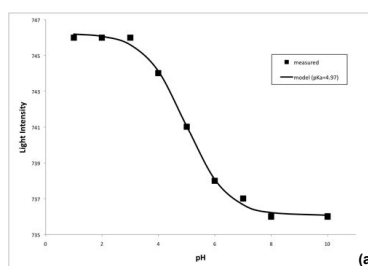
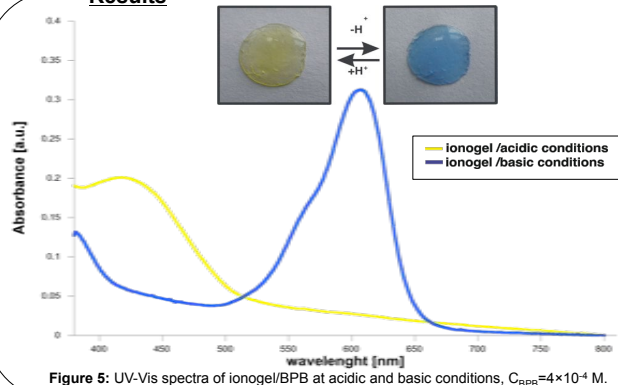
## Materials



## Experimental



## Results



$$I = \left[ \frac{a}{1 + e^{b(pH-z)}} \right] * c + d$$

**Figure 6(c):** Mathematical model that correlates light intensity and pH.

$I$  = light intensity  
 $a$  = peak height  
 $b$  = slope coefficient  
 $z$  = point of inflection  
 $c$  = symmetry parameter for the sigmoid  
 $d$  = accounts for baseline offset

**Figure 6:** (a) Calibration curve showing pH vs. light intensity of BPB measured using a surface mounted Light Emitting Diode system. (b) Circuit diagram of the detection system. (c) Mathematical model that correlates light intensity and pH.

## Conclusions

In this work a hybrid ionogel of poly(NIPAAm-co-BIS)/[P<sub>4444</sub>][dca] incorporating Bromophenol Blue photoresponsive dye has been synthesised.

The main achievements of this hybrid material are:

- BPB dye in the ionogel matrix shows variation in colour at different pH's and that process is reversible. In the other hand, the mixture IL/BPB is not sensitive to changes in pH.
- The polymer matrix prevents leaching of the dye from the ionogel into the sample solution.
- The photo-polymerisation process during the material synthesis does not decrease the dye sensitivity to pH in the ionogel.

## REFERENCES

- [1] M. Blumentritt, et al., *Sens. Actuators B*, 131(2008), 504-508.
- [2] S. Capel-Cuevas, et al., *Analytica Chimica Acta* 681(2010), 71-81.
- [3] F. Benito-Lopez, et al., *BSN-2010, 26-28 June, (2010), Singapore*, 291-296.

## ACKNOWLEDGMENT

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