

## Responsive Ionic Liquid-Polymer 2D Photonic Crystal Gas Sensors

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5 The supporting information contains details on the near infrared absorption measurements used to determine the concentration of water in ethylguanidine perchlorate solutions. We focus on the water absorptions bands at 1420 nm and 1915nm.

### Near Infrared Absorption of Water in EGP

10 The absorption of water in EGP was measured using a Varian CARY5000 UV-vis-IR spectrometer, scanning over the range of 1200-2200 nm at a rate of 500nm/min. A 1 mm path length quartz cuvette was used and it was rinsed with water several times followed by acetone between samples. EGP/water mixtures were made with 0, 0.1, 0.25, 0.5, 0.75, and 0.9 mole fractions water in EGP. The NIR spectra of defined concentrations of water in EGP are shown in Figure S1. Figure

20 S2 shows the absorption at 1915 nm and 1420 nm, plotted as a function of the mole fraction of water in EGP. Equations generated from the best fit lines were used to calculate the mole fraction of water present in EGP from the absorbance data.

25 A small amount of EGP was taken from the vials containing the IL2DPC films after equilibrating in 0.5, 13, 22, 52, 80, and 97% Relative Humidity. The NIR spectra for these samples are shown in Figure S3. The absorbance at 1420 nm and 1915 nm were used to calculate the mole fraction of water absorbed by EGP for each relative humidity. These results are tabulated in Table S1.

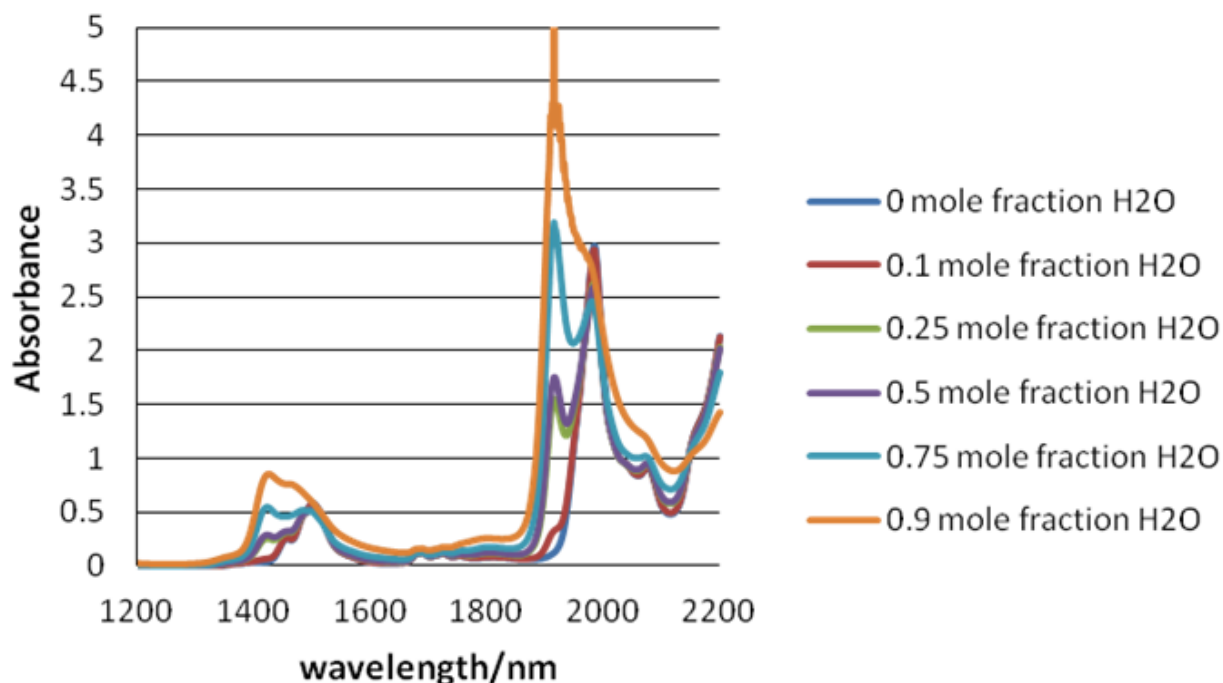
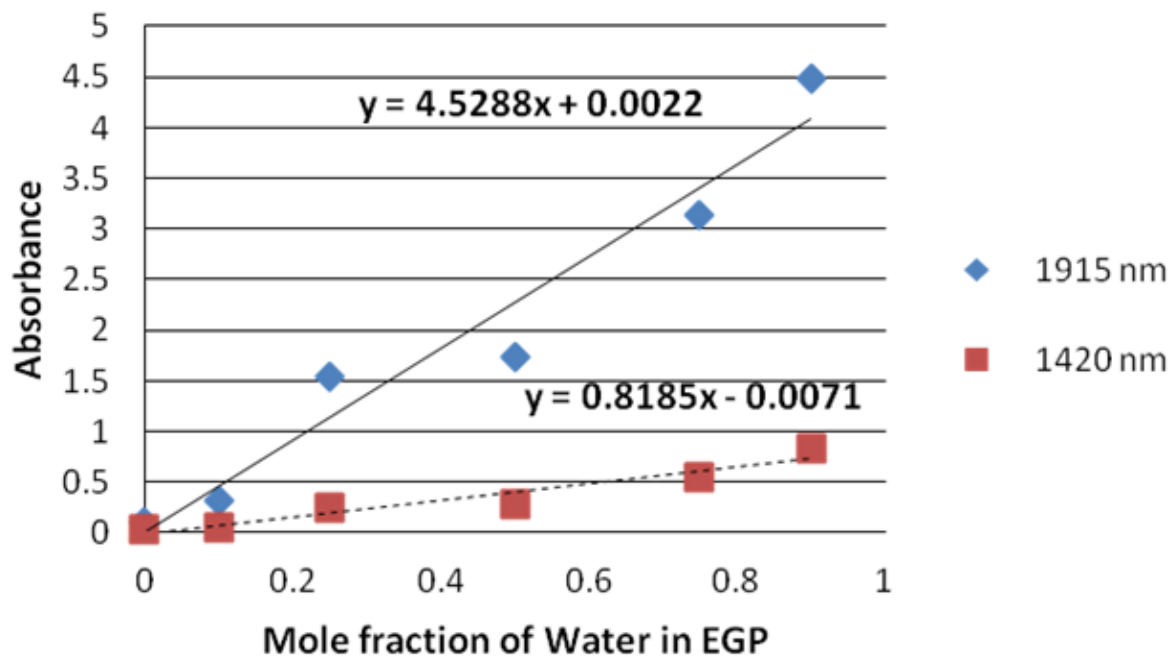
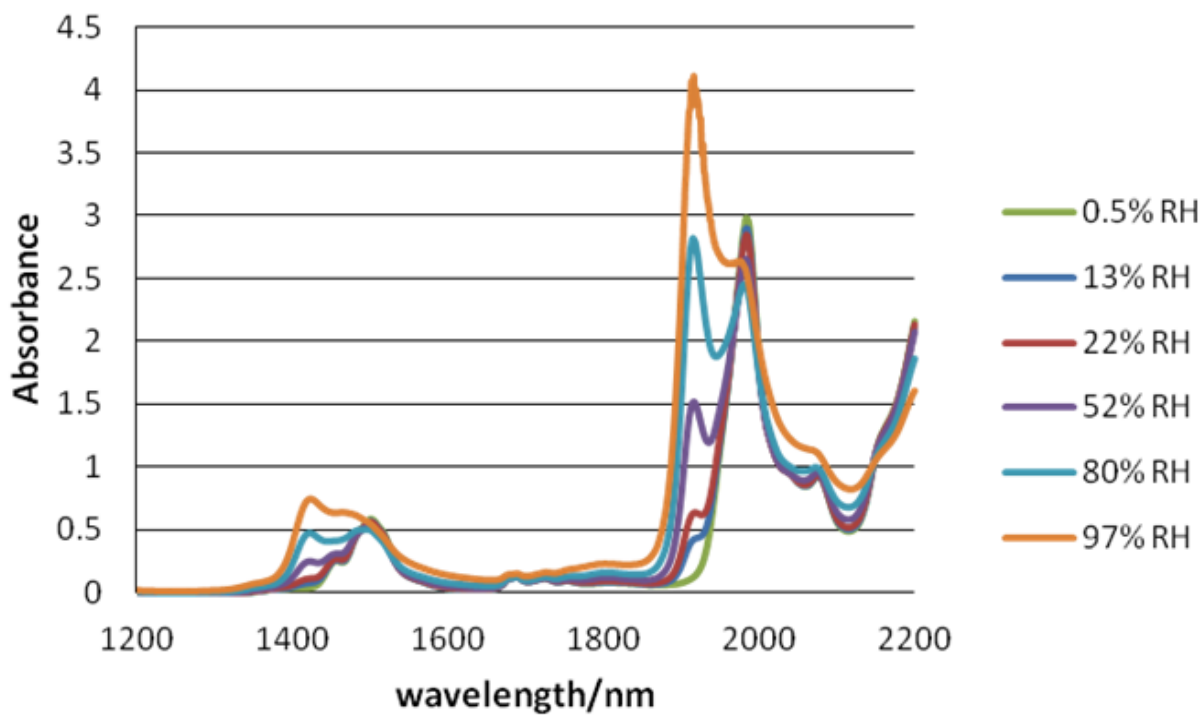


Fig.S1 NIR Spectra of defined water concentrations in EGP.



5 Fig.S2 Optical densities of water absorption overtones at 1915 nm (blue diamonds) and 1420 nm (red squares).



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**Fig.S3** NIR spectra of water absorbed by EGP after equilibrating for 48 hr.

**Table S1** Calculated mole fractions of water in EGP equilibrated in 0.5, 13, 22, 52, 80, and 97% relative humidities.

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% Relative Humidity	OD at 1420 nm	OD at 1915 nm
0.5	0.046	0.025
13	0.097	0.091
22	0.14	0.14
52	0.31	0.33
80	0.59	0.62
97	0.91	0.87

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