Electronic Supplementary Information

Capture and immobilisation of Iodine (I_2) utilising polymer-based ZIF-8 nanocomposite membranes

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This supplementary document contains:

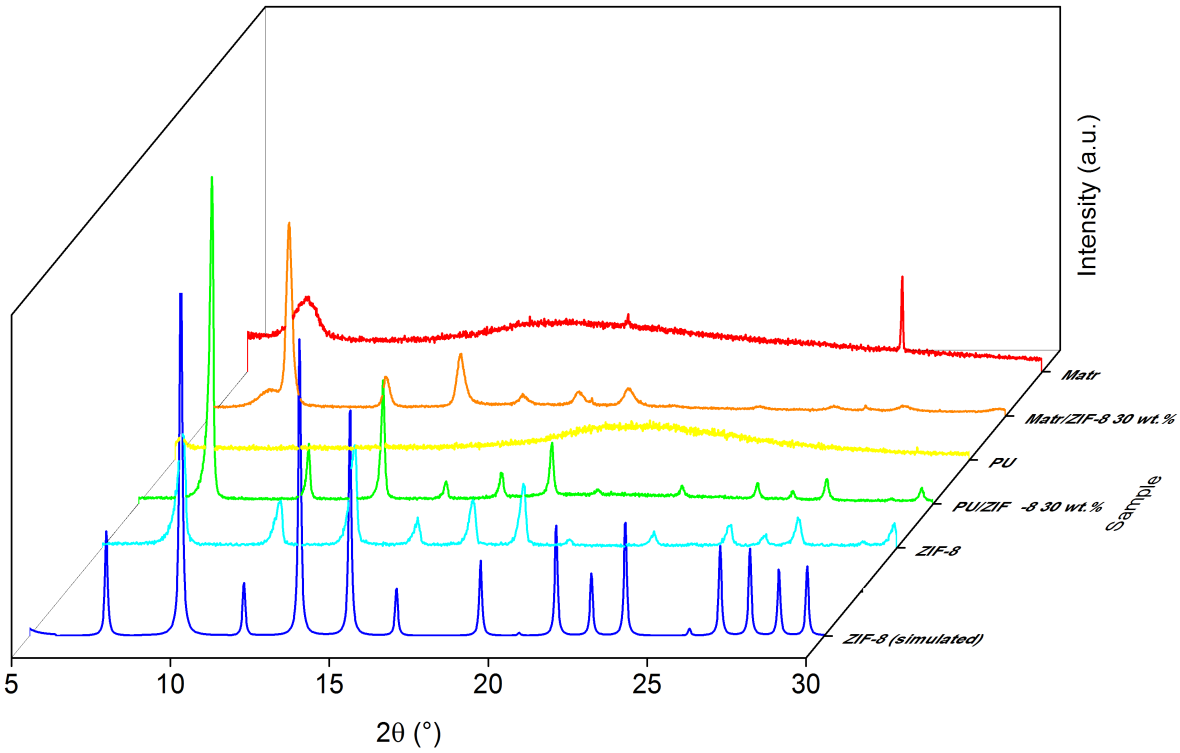

Figure S1. XRD of the polymers, ZIF-8 nanoparticles, its simulated pattern (from CSD Mercury v3.1), and the corresponding ZIF-8 nanocomposites

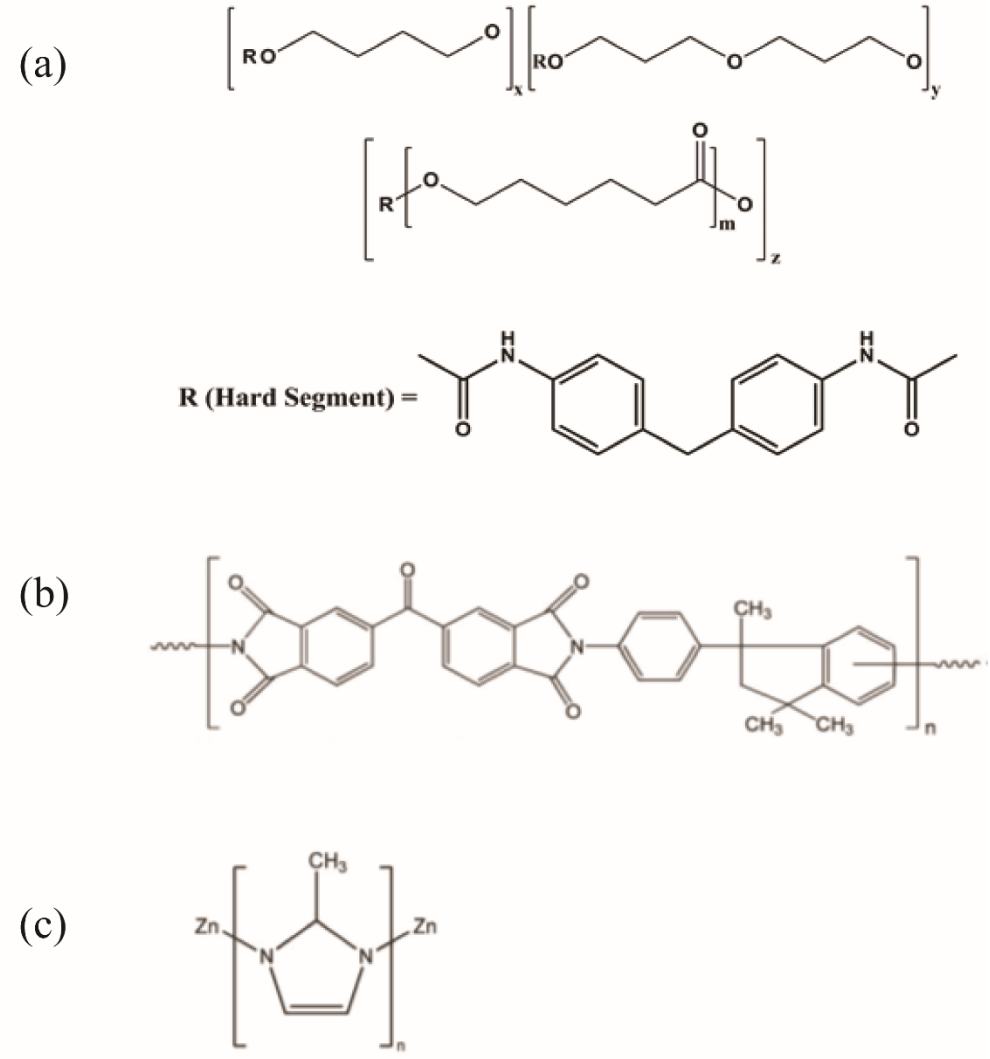

Figure S2. The chemical structures of the polymers and ZIF-8. Polyurethane (PU) is made up of hard and soft segments, as shown in (a), where the hard segments form bonds with other organic or organic based compounds. Matrimid is a glassy polymer, forming hard and very durable coating when dried. It is also made up of quite a few benzene rings, as shown in (b), which could form π-π bonds with ZIF-8, and (c) shows the chemical structure of ZIF-8, where the methyl group and the nitro group form bonds with the polymers when fabricating nanocomposites.

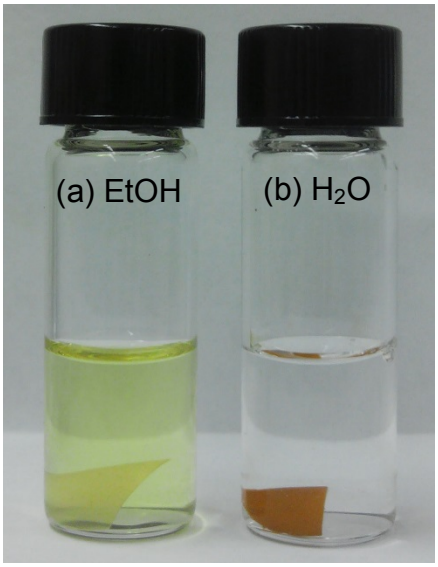

Figure S3. The vials above are of the PU/ZIF-8 30 wt.% I_2-absorbed samples being set up for desorption experiments, with (a) EtOH (ethanol) medium, and (b) H_2O medium. The samples were left to desorp for 10 days, and after 10 days, the I_2 desorp into EtOH, but was completely retained in H_2O, with no signs of I_2 being released into H_2O. This proves that polarity of the medium is instrumental towards the release of I_2 from the nanocomposites, however, they remain stable in H_2O.

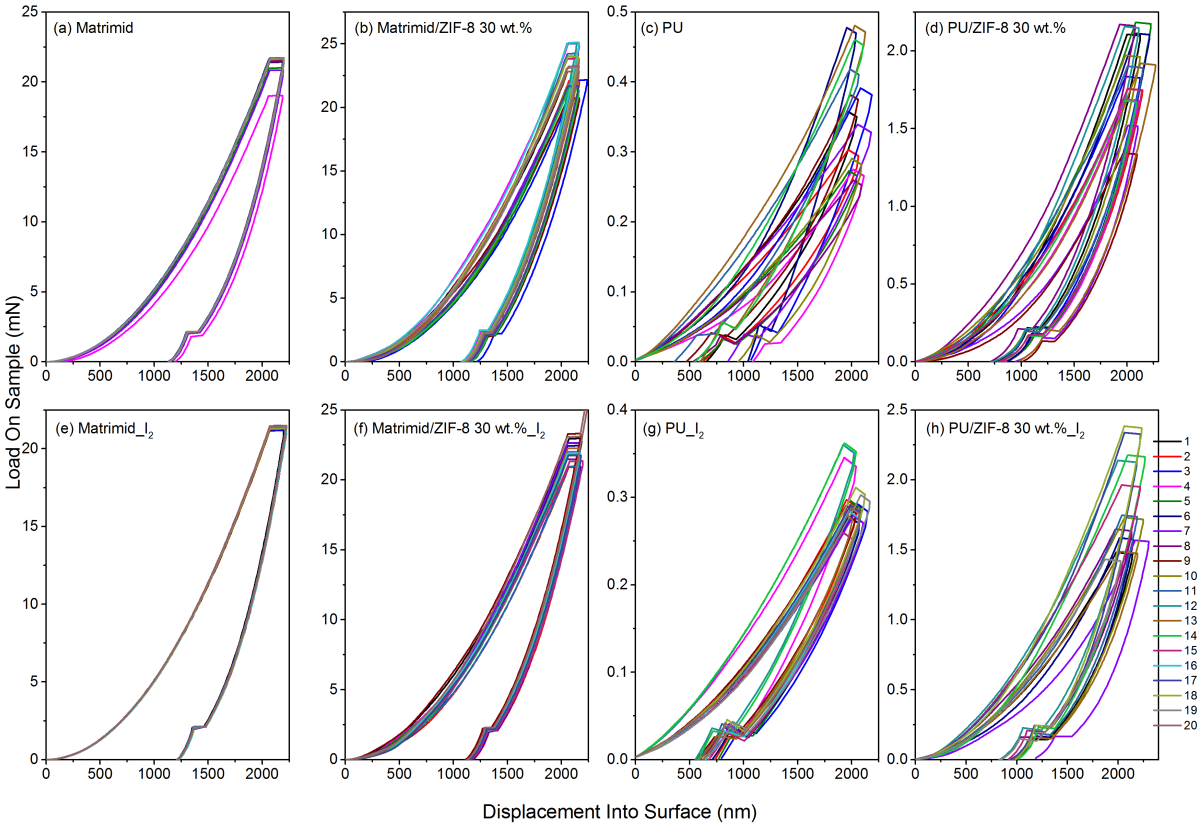

Figure S4. Nanoindentation load-displacement (*P-h* representative) plots for Matrimid, PU, and ZIF-8 nanocomposites, both blanks and loaded samples containing I_2, with (a) Matrimid (blank), (b) Matrimid/ZIF-8 30 wt.% (blank), (c) PU (blank), (d) PU/ZIF-8 30 wt.% (blank), (e) Matrimid (I_2 absorbed), (f) Matrimid/ZIF-8 30 wt.% (I_2 absorbed), (g) PU (I_2 absorbed), (h) PU/ZIF-8 30 wt.% (I_2 absorbed). Note that the relatively higher scatter for the PU and PU nanocomposite could be attributed to the hyperelastic response of PU matrix.

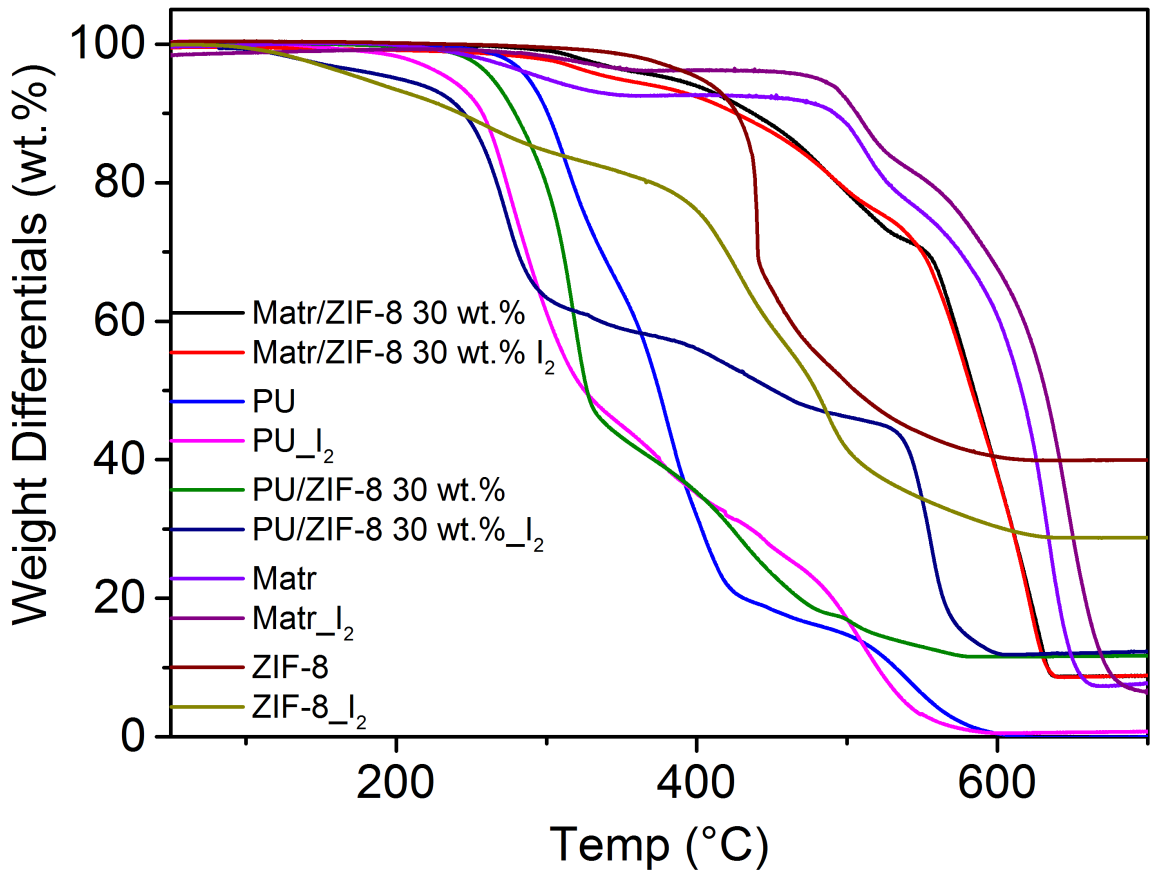

Figure S5. Compilation of the raw data pertaining to the TGA analyses of the polymers (PU, Matrimid), its nanocomposites (PU/ZIF-8 30 wt.% and Matr/ZIF-8 30 wt.%) and ZIF-8 nanoparticles pre- and post- I_2 absorption.

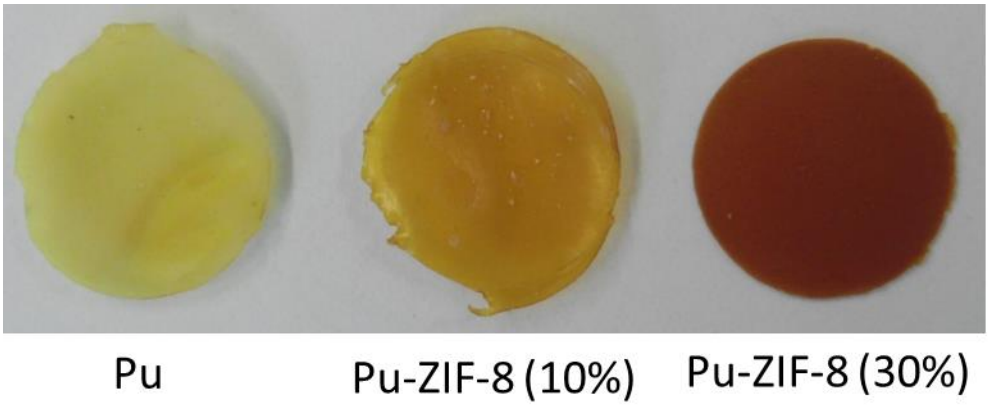

Figure S6. Effects of iodine capture in three PU-based membrane samples, showing the differing colouration intensity with an increasing MOF content from 0 to 30 wt.%.