

1 **Supplementary materials**

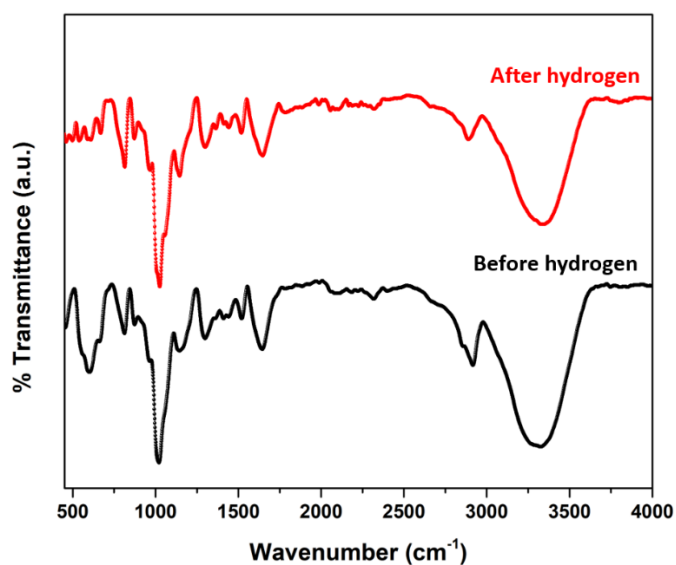
2
3 **Bimetallic PdPt nanoparticles incorporated PEDOT:PSS/Guar gum blended**
4 **membranes for enhanced CO₂ separation**

5
6 **Nishel Saini^a, Gaurav Pandey^a, Ankit Sharma^b, Kamakshi Pandey^{a,b}, Kamlendra Awasthi^{a*}**

7
8 ^aDepartment of Physics, Malaviya National Institute of Technology Jaipur, Rajasthan 302017,
9 India

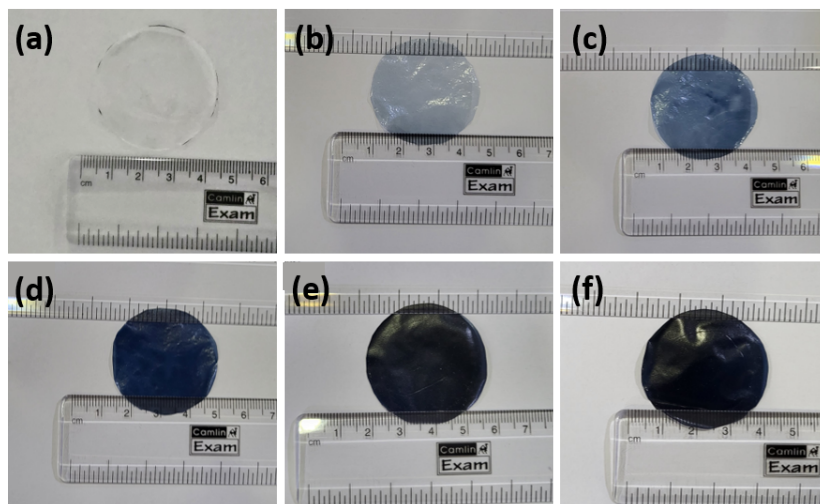
10 ^bMaterials Research Centre, Malaviya National Institute of Technology, Jaipur 302017, India

11
12 *Corresponding author email: kawasthi.phy@mnit.ac.in



14
15 **Figure S1.** FTIR spectrum of 20% PEDOT:PSS/PdPt/GG composite membranes before and
16 after hydrogen separation experiment.

17

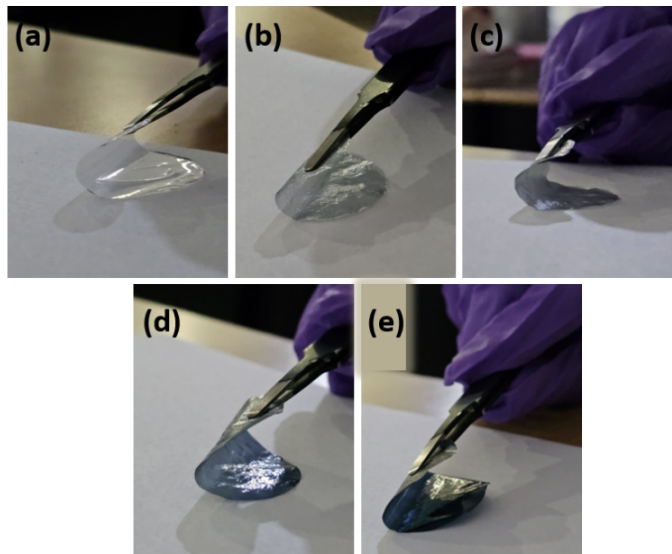


18

19 **Figure S2.** Photographs of the front view of (a) pure GG, (b) 5% PEDOT:PSS/GG, (c) 10%
20 PEDOT:PSS/GG, (d) 15% PEDOT:PSS/GG, (e) 20% PEDOT:PSS/GG, and (f) 50%
21 PEDOT:PSS/GG membranes.

22

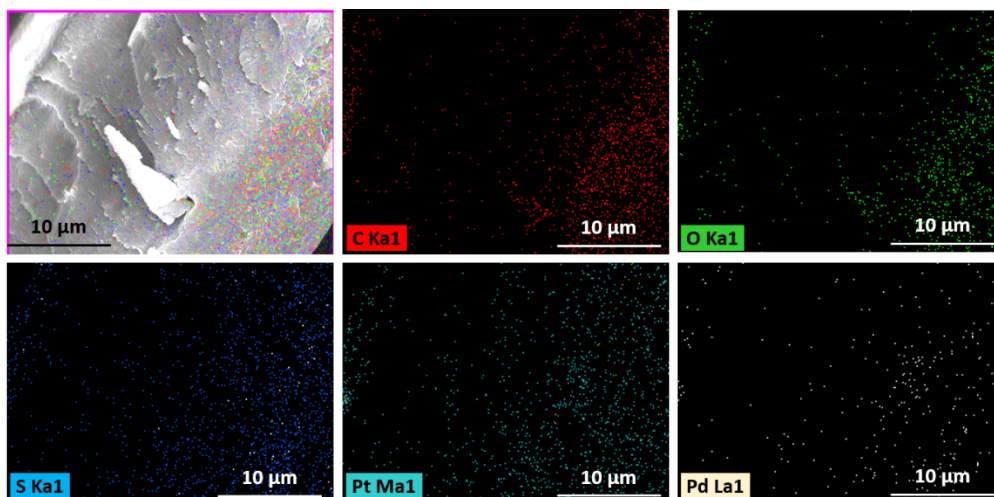
23



24

25 **Figure S3.** Photographs of the folded view of (a) pure GG, (b) 5% PEDOT:PSS/GG, (c) 10%
26 PEDOT:PSS/GG, (d) 15% PEDOT:PSS/GG, and (e) 20% PEDOT:PSS/GG.

27



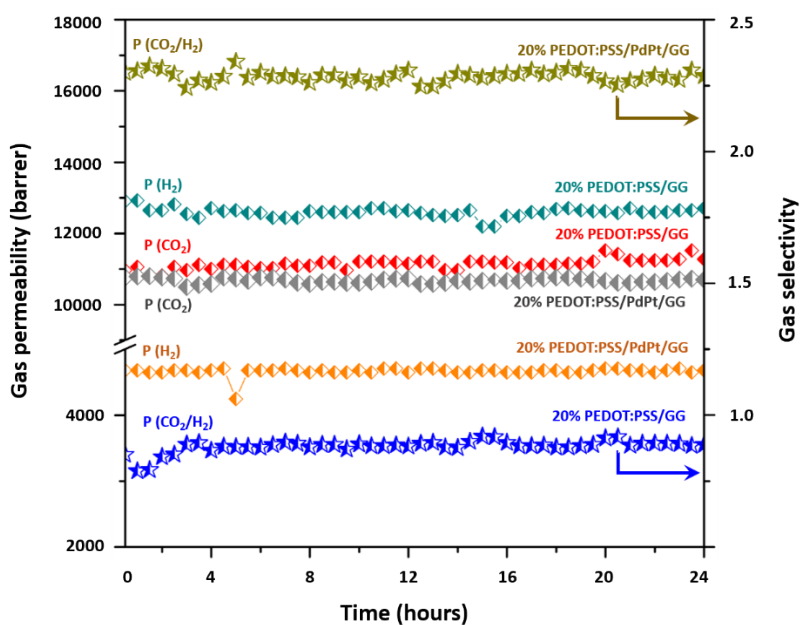
28

29

30

31

Figure S4. EDS mapping images cross-section of C, O, S, Pt, and Pd elements in 20% PEDOT:PSS/PdPt/GG composite membranes.



32

33

34

35

36

Figure S5. CO₂/H₂ separation performance of 20% PEDOT:PSS/GG and 20% PEDOT:PSS/PdPt/GG composite membranes.

Table S1. FTIR peak assignment corresponding to the Guar gum material.

Peaks (cm ⁻¹)	Bond assignments
---------------------------	------------------

811	C-H stretching vibrations (aromatic ring)
870	C-H bending vibrations (aromatic ring)
1015, 1062, 1144	Ester group (-C-O-C-) group
1644	C-C bond stretching
2915	Stretching vibrations of -CH group
3341	Stretching vibrations of -OH groups

37

38

39

Table S2. FTIR peak assignment corresponding to the PEDOT:PSS material.

Peaks (cm⁻¹)	Bond assignments (PEDOT: PSS)
708	C-S stretching
854, 1008	C-S-C bond in thiophene ring in PEDOT
1059	Symmetric -O-S-O- deformation in PSS
1125	Ester group (-C-O-C-) asymmetric stretching
1162	S-O bond vibrations
1256	Ester group (-C-O-C-) symmetric stretching
1373	Alkyl C-H bending (aliphatic hydrocarbons)
1535	-C=C group vibrations
1733	C-C bond stretching (phenyl group)

40