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Synthesis of Uniform Microporous Polymer Nanoparticles and Their Applications for Hydrogen Storage

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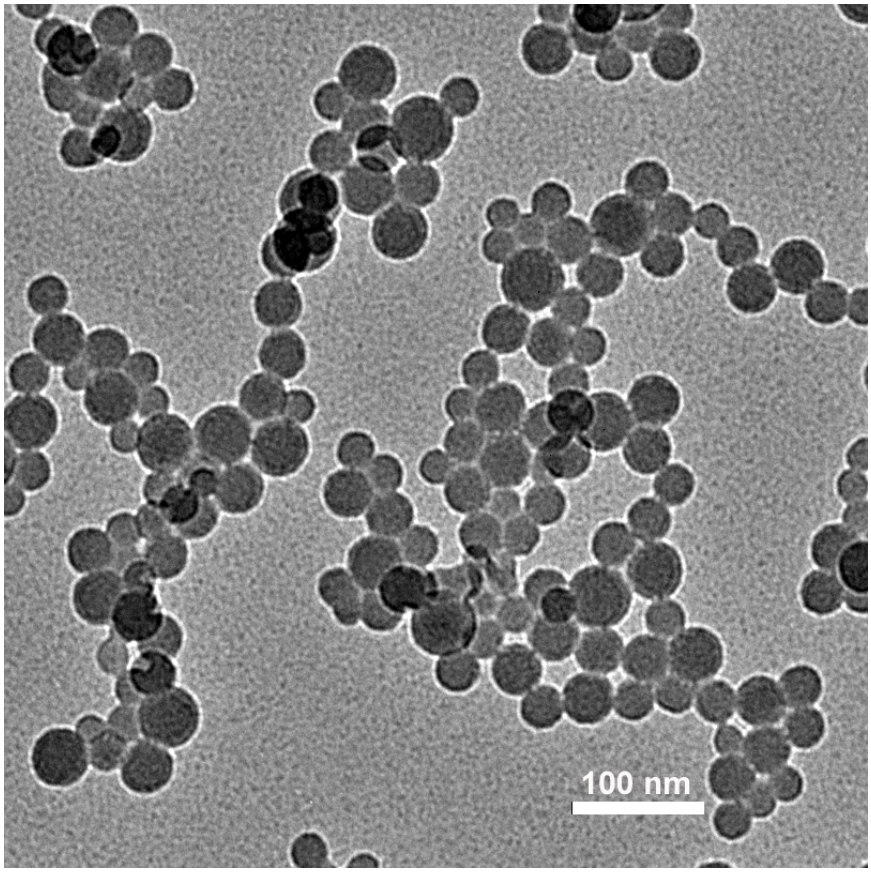

Fig. S1 TEM image for precursor emulsion with 45 nm was taken on a Tecnai G20 microscope (FEI Corp. USA) instrument operated at an accelerating voltage of 200 kV.

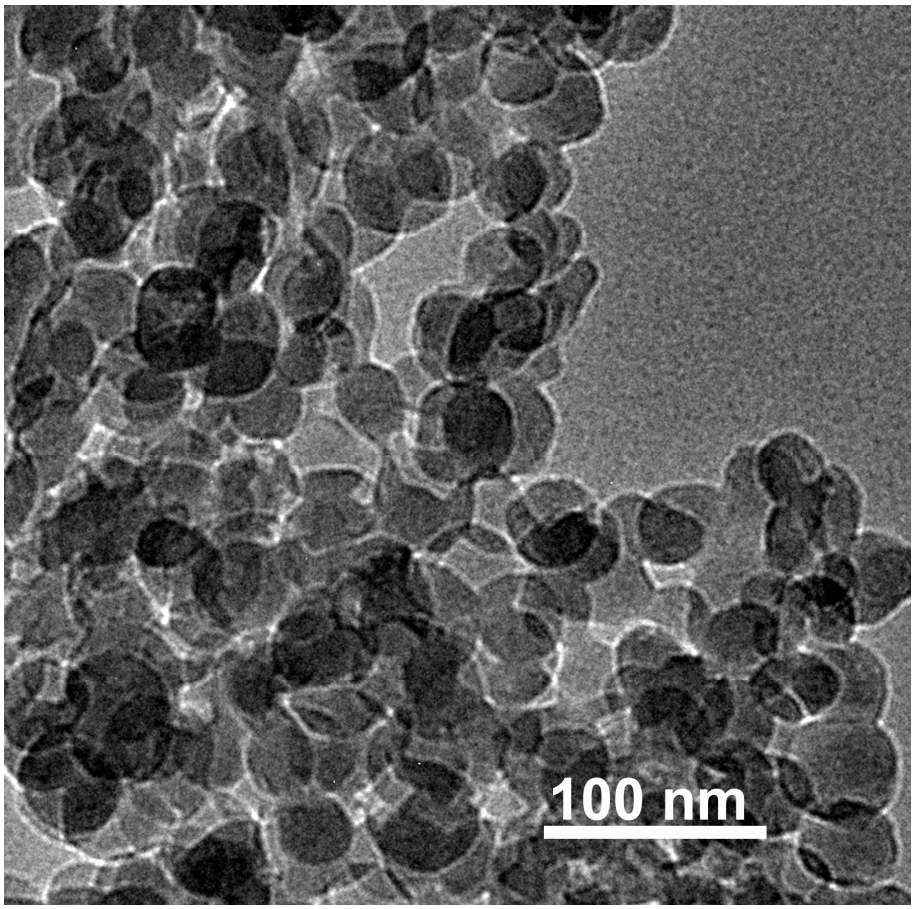

Fig. S2 TEM image for MPNs with 45 nm was taken on a Tecnai G20 microscope (FEI Corp. USA) instrument operated at an accelerating voltage of 200 kV.

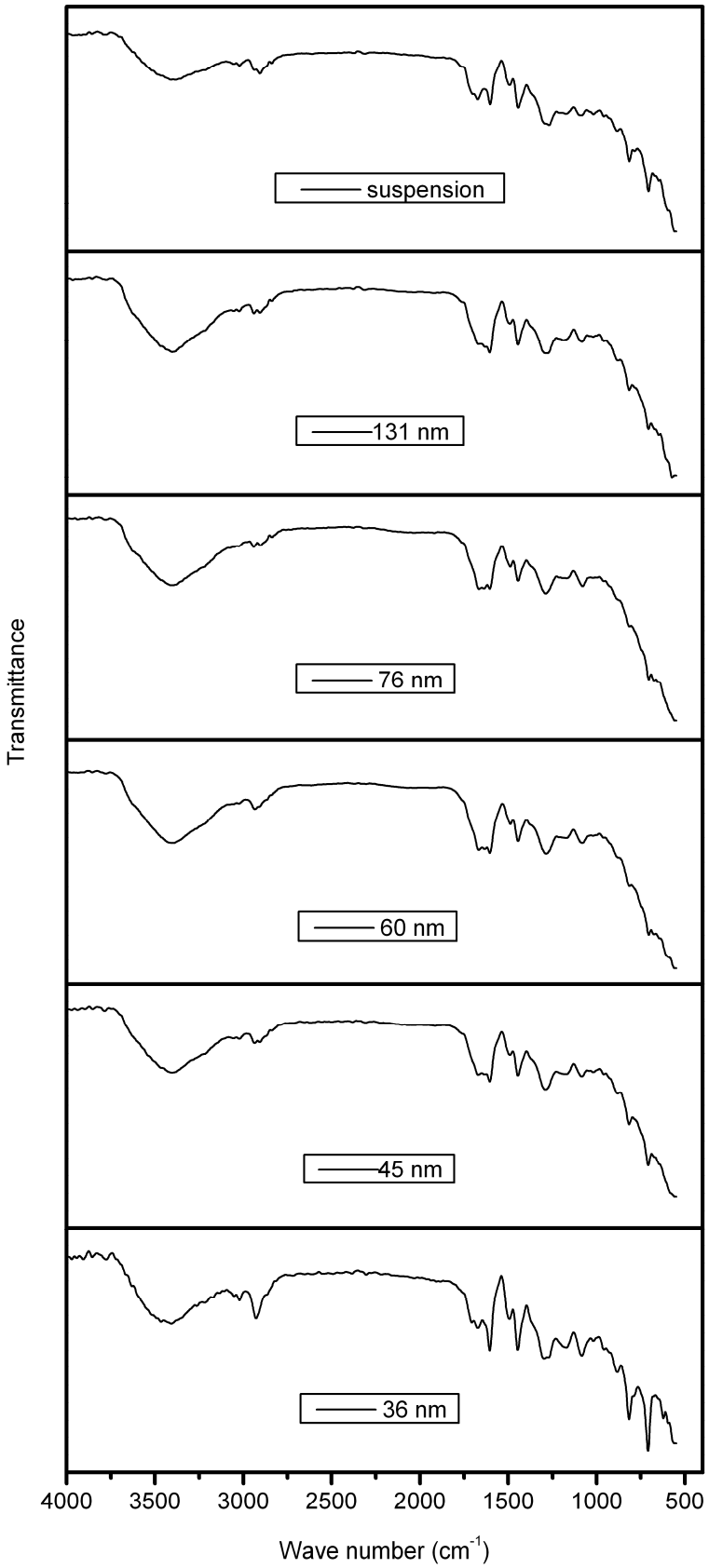

Fig. S3 Samples were analyzed with Bruker VERTEX 70 FT-IR Spectroscopy and ATR Accessory under ambient conditions in the wave number range of 4000-400 cm^{-1}.

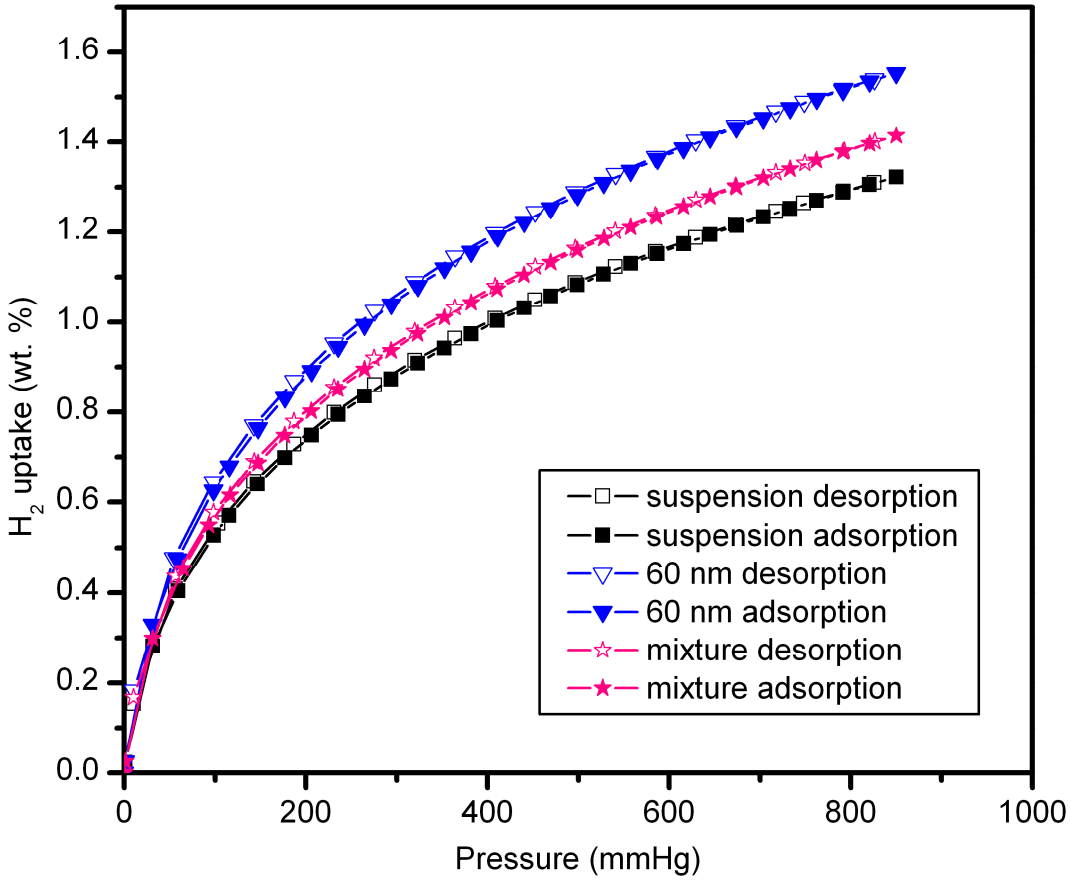

Fig. S4 Volumetric H_2 adsorption isotherms and desorption isotherms for "Davankov Resins" and MPNs with 60 nm and their mixture (volume ratio, 1:1) up to 1.13 bar at 77.3 K.

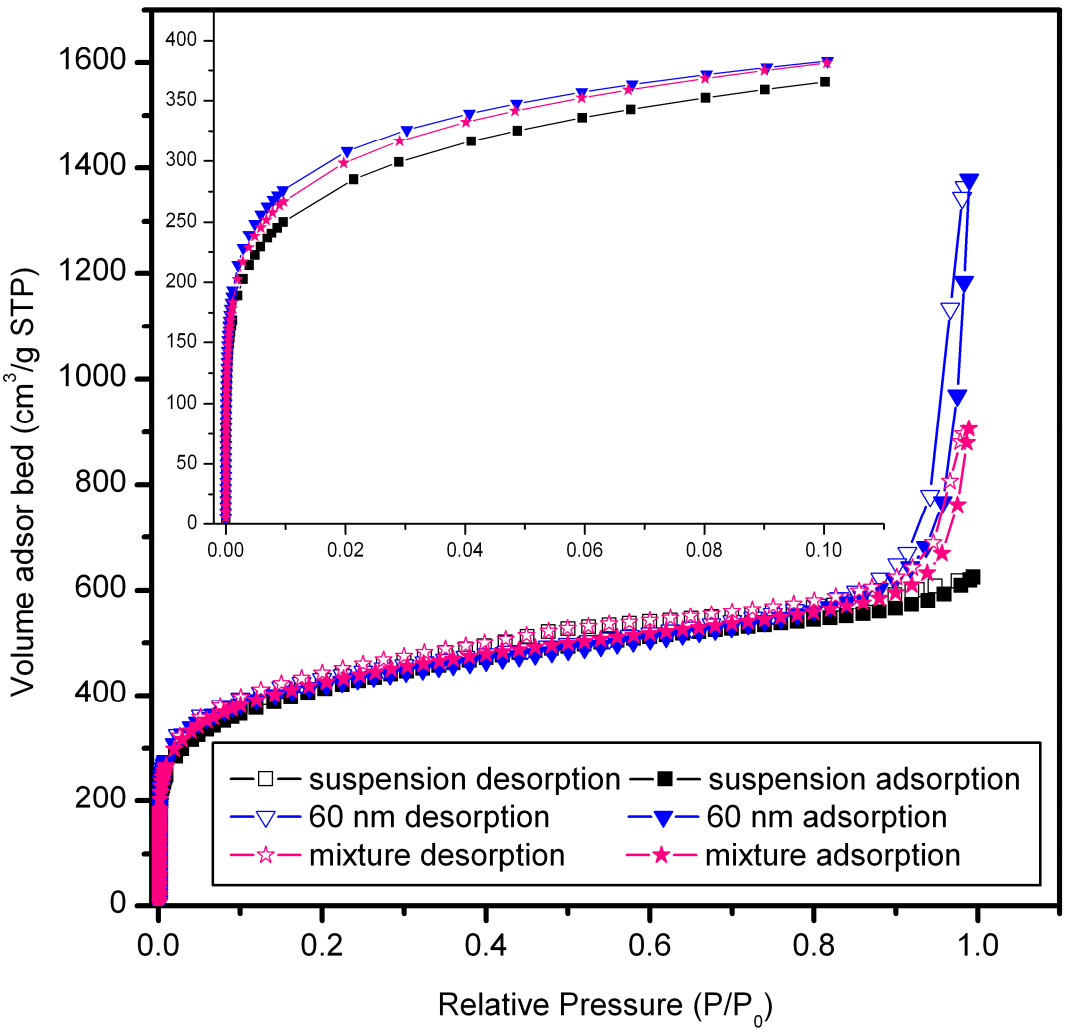

Fig. S5 Nitrogen adsorption isotherm and desorption isotherm for "Davankov Resins" and MPNs with 60 nm and their mixture (volume ratio, 1:1) at 77.3 K.

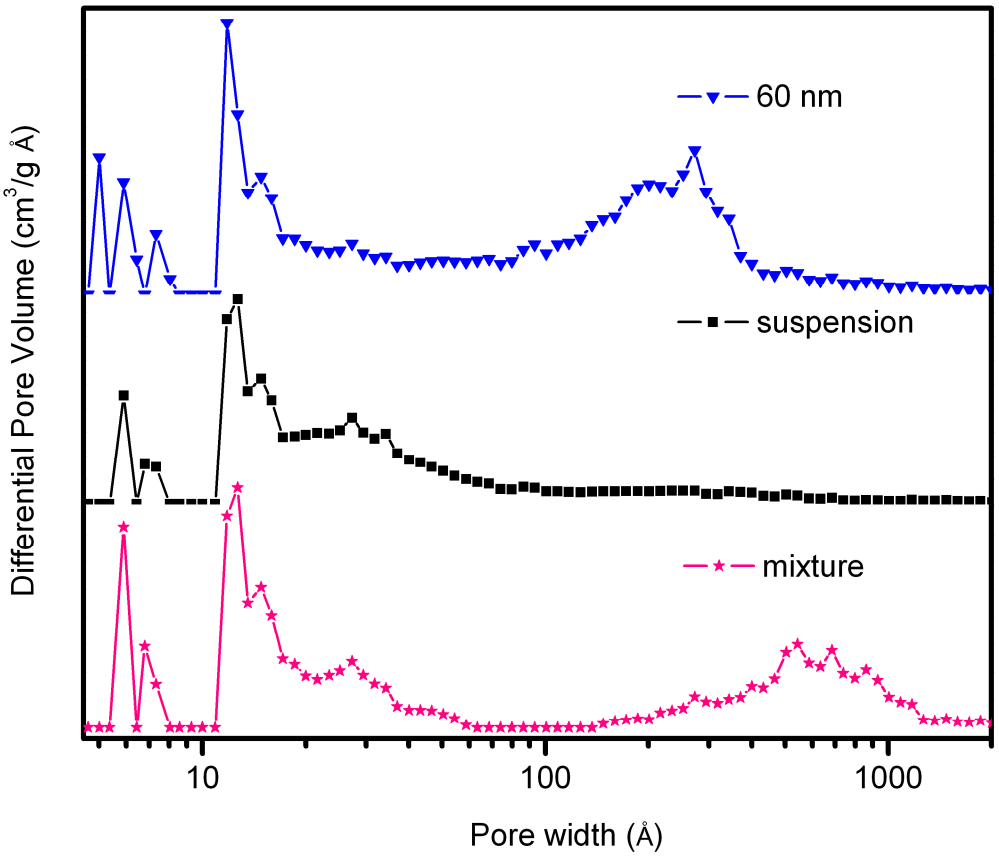

Fig. S6 Pore size distributions for "Davankov Resins" and MPNs with 60 nm and their mixture (volume ratio, 1:1) using DFT methods (slit pore models, Differential Pore Volume vs. Pore Width).

Table S1 Packing density, surface area, pore structure and H_2 uptakes for "Davankov Resins" and MPNs with 60 nm and their mixture (volume ratio, 1:1).

No.	Particle size (nm)[a]	Packing density (g/cm^3)	S_{BET}[b] (m^2/g)	S_L[c] (m^2/g)	V_{mi}[d] (cm^3/g)	V_t[e] (cm^3/g)	V_{mi}[f] (cm^3/g)	V_t[f] (cm^3/g)	H_2 uptake (g/L)[g]	H_2 uptake (wt%)[g]
1	100μm[h]	0.344	1460	1965	0.48	0.97	0.41	0.83	4.54	1.32
4	60	0.257	1463	1975	0.54	2.13	0.45	1.35	3.93	1.53
7[i]	N.D.[j]	0.384	1492	2024	0.53	1.40	0.41	0.85	5.45	1.42

Note.

[a] DLS (Dynamic Light Scattering) results;

[b] Brunauer-Emett-Teller surface area;

[c] Langmuir surface area;

[d] Micropore volume determined from the N_2 isotherm at $P/P_0 = 0.050$;

[e] Total pore volume determined from the N_2 isotherm at $P/P_0 = 0.995$;

[f] Slit pore model used in DFT calculations;

[g] Determined volumetrically using a Micromeritics ASAP 2020 M analyzer at 77.3 K and 1.13 bar;

[h] The particle size was estimated according to the FE-SEM image;

[i] Sample 7 is mixture of "Davankov Resins" and MPNs with 60 nm in volume ratio of 1:1;

[j] N.D. means the sample was not determined in this parameter.