Supporting Information

Exploring the Self-Assembly of a Fully Protected L-Dopa from Different Organic Solvents and the Relationship Between Gel and Crystal Structures

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Experimental Section

Synthesis of 1. The gelator Boc-L-Dopa(Bn)$_2$-OMe (**1**) was synthesized as reported previously. All the characterizations matched the ones in the literature.[1]

METHOD 1.

Fiber preparation. 20 mg of **1** were weighted in glass vials and dissolved using the 1 mL of the mixtures of solvents reported, first by stirring (5 minutes) then by ultrasound sonication (5 minutes). The vial cap was left half open, to allow a slow evaporation of the solvent. The formation of fibers was observed already inside the solvent, without the need for evaporation.

Figure S1. Fibers of **A** and **B** formed inside the solvent and by solvent evaporation.

METHOD 2.

Crystal preparation. Crystals were obtained by vapor diffusion crystallization. 35 mg of **1** were dissolved in 5 mL of EtOH in a vial by ultrasound sonication. The open vial was then inserted in a bottle containing 5 mL of cyclohexane on the bottom and the bottle was closed.

METHOD 3.

Gel preparation. 20 mg of **1** were weighted in glass vials and dissolved using 2 mL of organic solvent (see Table S1) in order to have a 1% w/V concentration of gelator. In the majority of the solvents listed, the solubilisation was almost immediate, or it was obtained with a slight stirring of the sample. These cases lead to a clear solution. For some solvents, the complete solubilisation was obtained by heating the system till 45-50 °C. The vials were left to cool down until rt, then the sonication was used as a trigger for the gelification process. This leads to the formation of a white gel, which was evaluated first by the vial inversion method, and then by rheology.

Aerogel preparation. 3 mL of gel samples were prepared inside 10 mL glass vials with the same procedure described above. All the gels were left to rest for 16 h at room temperature after their preparation. The obtained organogels were soaked in liquid nitrogen to promote a fast-freezing process and then they were lyophilized overnight, until the complete removal of the solvent.

Ultrasound Sonication. An Argo Lab digital ultrasonic cleaner (DU-32) with an ultrasonic frequency of 40 KHz and an ultrasonic power of 120 W was used for the purpose of dissolving the gelator in the different organic solvents (T_{bath} = 25 °C, constant during the 5 min of sonication).

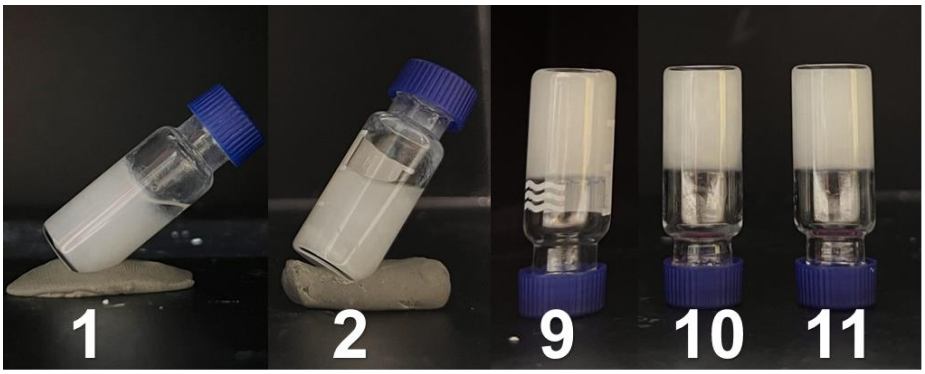

Figure S2. Photos of the partial gels from n-hexane and cyclohexane (entry 1 and 2, table 1, respectively) and of the gels **D-F** (entry 9 – 11, table 1), obtained as described.

Rheology. All rheological measurements were performed using an Anton Paar (Graz, Austria) MCR102 rheometer. The gels were prepared as described and tested directly in the glass test tubes (L x h = 14 x 42 mm), which fit in the rheometer. A vane and cup measuring system was used, setting a gap of 2.1 mm.

Oscillatory amplitude sweep experiments (γ: 0.01−100 %) were performed at 23 °C using a constant angular frequency of 10 rad/s.

Frequency sweep tests (ω: 0.1−100 %) were performed at 23 °C, setting a constant γ of 0.02 % (within the LVE region).

The thixotropic behavior of the organogels was assessed with strain-recovery experiments, subjecting the samples to consecutive deformation and recovery steps. The first step (rest conditions) was performed at a constant strain γ = 0.02 % (within the LVE region) and at a fixed frequency of ω = 10 rad s^{-1} for a period of 300 s. The deformation step was performed applying a constant strain of γ = 100 %, (above the LVE region) for a period of 300 s. The recovery step was performed with the same conditions of the first step for a period of 600 s. Deformation and recovery steps were repeated two times.

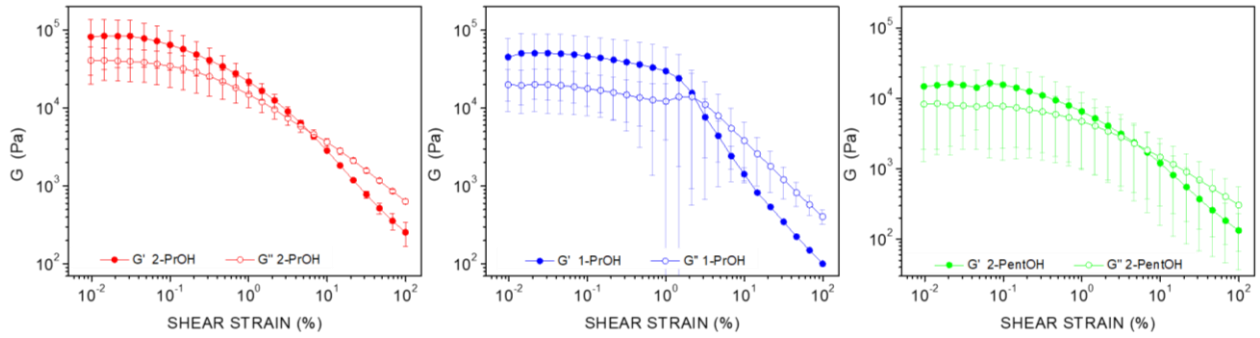

Figure S3. Amplitude sweeps of gels **D** (red), **E** (blue) and **F** (green) performed in triplicate.

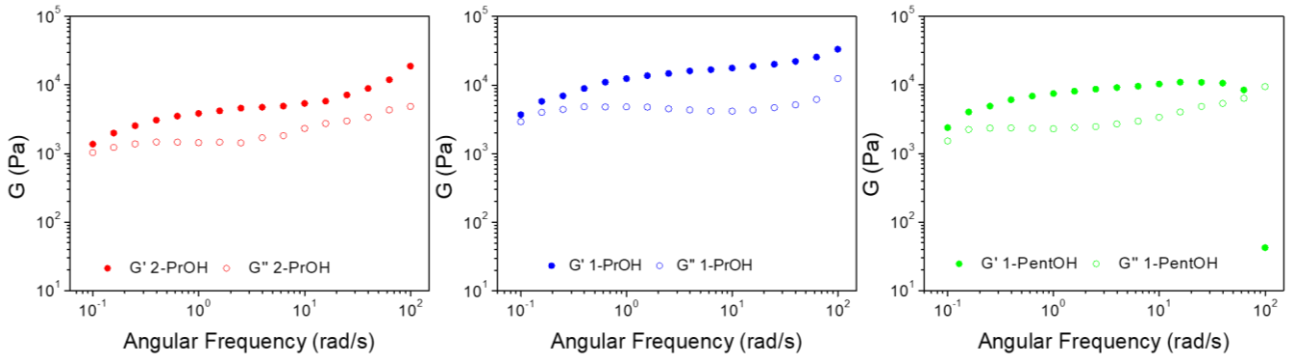

Figure S4. Frequency sweeps of gels **D** (red), **E** (blue) and **F** (green), γ = 0.02 %.

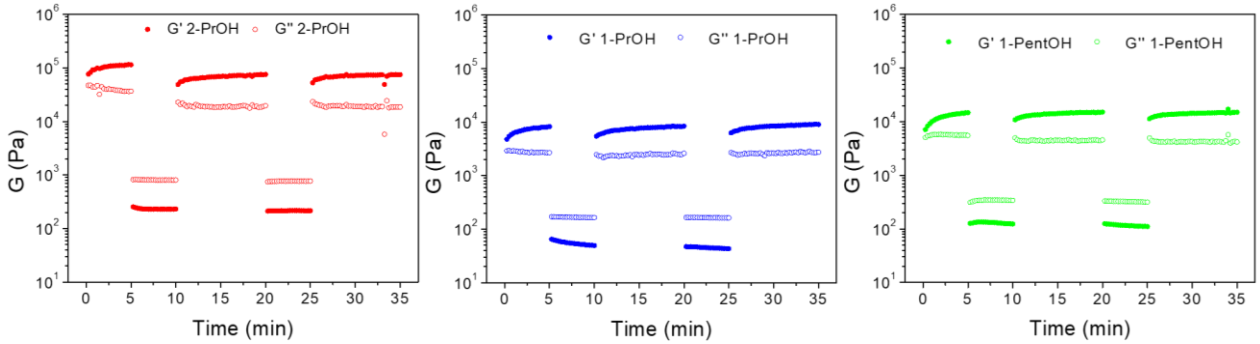

Figure S5. Strain-recovery experiments performed on gels **D** (red), **E** (blue), and **F** (green).

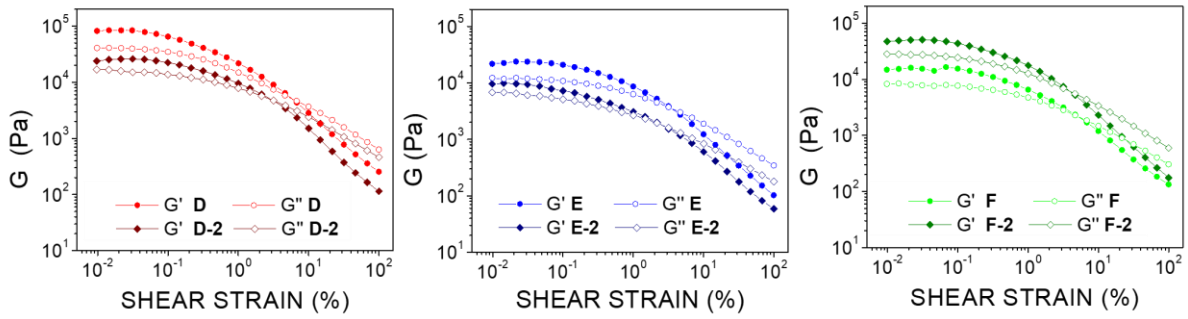

Figure S6. Amplitude sweeps of the gels samples as freshly formed (lighter colors, **D**, **E** and **F**) and after being dissolved by heating and reformed through sonication (darker colors, **D-2**, **E-2** and **F-2**).

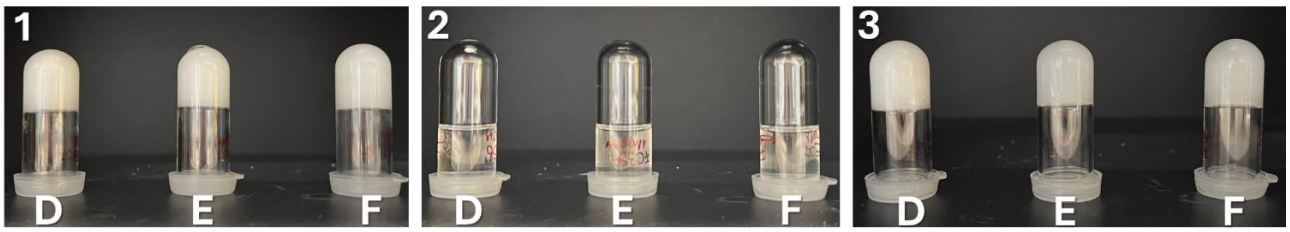

Figure S7. Photos of the gels **D-F** after formation (1), after dissolution through heating (2) and after sonication and reformation (3). The glass vials are the same used for the rheological tests.

Optical microscopy. The images were recorded using a Nikon (Tokyo, Japan) Eclipse 90i optical microscope. Gels and fibers used for optical microscopy were prepared as described, and then a small piece of the gel or fibrous sample was transferred onto a glass microscope slide and analyzed.

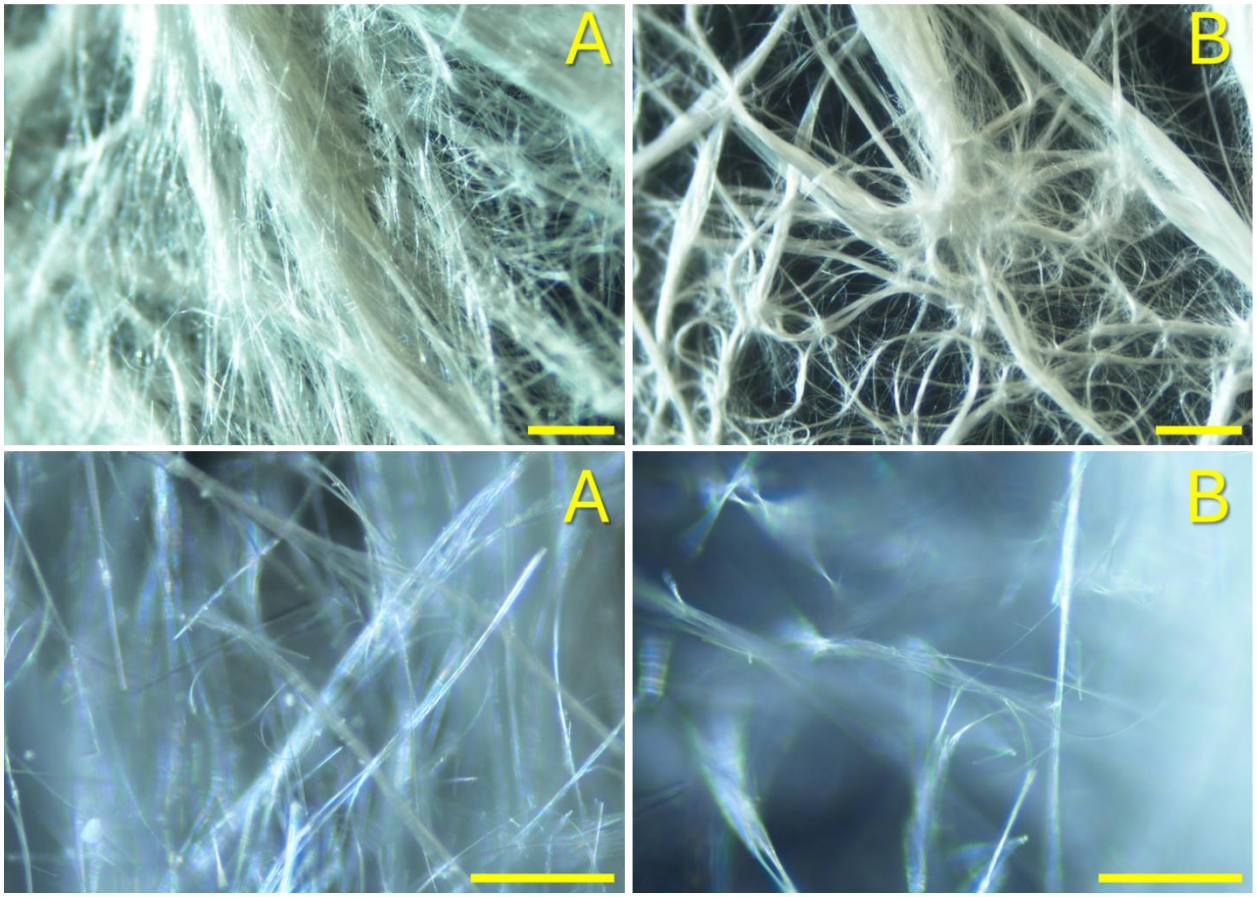

Figure S8. Optical microscope images using a 4x magnification (top) and a 20x magnification (bottom) under polarized light of fibers **A** – **B**. The scalebar represents 300 µm for the top images, and 100 µm for the bottom ones.

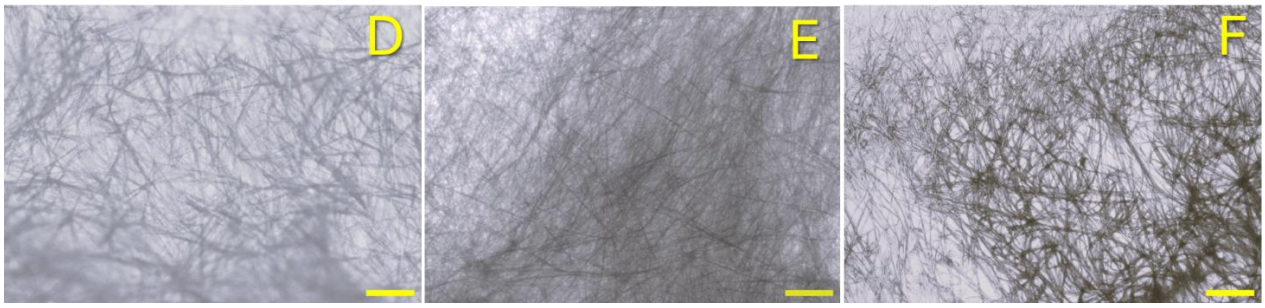

Figure S9. Optical microscope images using a 10x magnification of gels **D** – **F**. The scalebar represents 100 µm.

XRD diffraction. Single-crystal data for Boc-L-Dopa(Bn)$_2$-OMe were collected at RT on an Oxford X'Calibur S CCD diffractometer equipped with a graphite monochromator (Mo-Kα radiation, λ = 0.71073 Å). The structure was solved with SHELXT[2] by intrinsic phasing and refined on F[3] with SHELXL[3] implemented in the Olex2[4] software by full-matrix least squares refinement. All non-hydrogen atoms were anisotropically refined and the rigid-body RIGU[5] restraints applied. H_{NH} atoms were either directly located or added in calculated positions, H_{CH} atoms for compound DOPA were added in calculated positions and refined riding on their respective carbon atoms. See Table S2 for crystallographic and refinement details. The Mercury[6] program was used to calculate intermolecular interactions and for molecular graphics. Crystal data can be obtained free of charge from the Cambridge Crystallographic Data Centre (CCDC)[7] via www.ccdc.cam.ac.uk/conts/retrieving.html (or e-mail: deposit@ccdc.cam.ac.uk); CCDC number 2371771.
For phase identification purposes, X-ray powder diffractograms in the 2θ range 5-40° (step size, 0.02°; time/step, 20 s; 0.04 rad soller; 40mA x 40kV) were collected on a Panalytical X'Pert PRO automated diffractometer equipped with an X'Celerator detector and in Bragg-Brentano geometry, using Cu Kα radiation without a monochromator. The software Mercury[6] was used to calculate the X-ray powder patterns based on single crystal data collected in this work. For all compound, the identity between polycrystalline samples and single crystals was verified by comparing experimental and calculated powder diffraction patterns.

Table S1. Crystal data and refinement details for compound Boc-L-Dopa(Bn)$_2$-OMe.

	Boc-L-Dopa(Bn)$_2$-OMe
Formula	$C_{29}H_{33}NO_6$
FW (g/mol)	491.56
Temperature (K)	293
Crystal System	Monoclinic
Space Group	$P2_1$
a (Å)	16.446(4)
b (Å)	5.3069(10)
c (Å)	31.346(10)
α (°)	90
β (°)	94.59(3)
γ (°)	90
Volume (Å^3)	2727.1
Z/Z'	2/2
ρ_{calc} (g/cm^3)	1.197
μ (mm^{-1})	0.083
Reflections collected	13315
Independent reflections	10066
Largest diff. peak/hole (e Å^{-3})	0.18/-0.17
R_1	0.0819
wR_2	0.2012

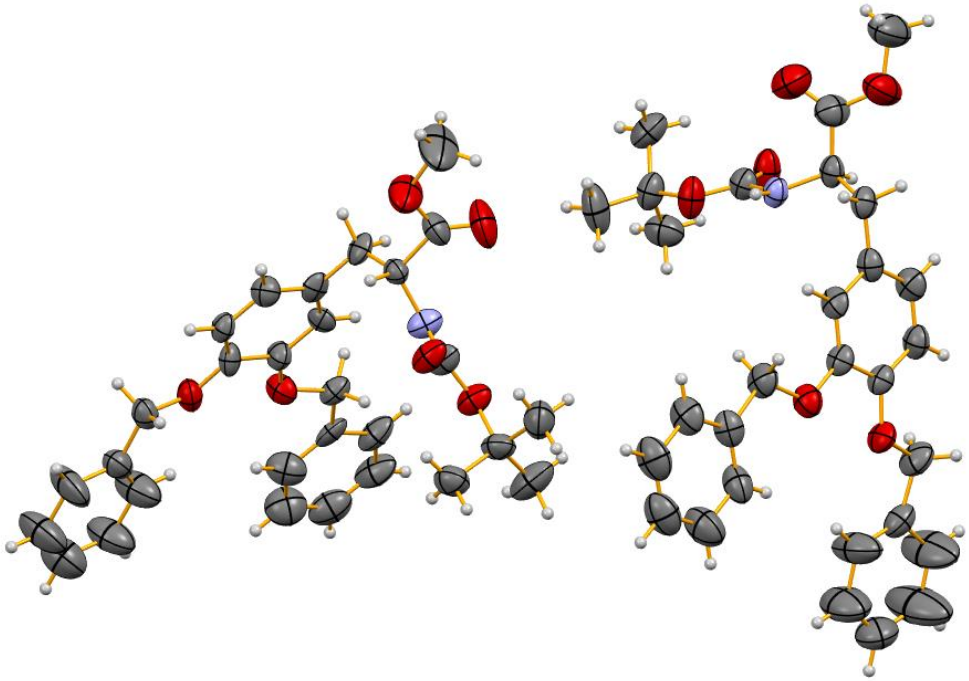

Figure S10. Ortep drawing of crystalline Boc-L-Dopa(Bn)$_2$-OMe (ellipsoids drawn at 50% probability).

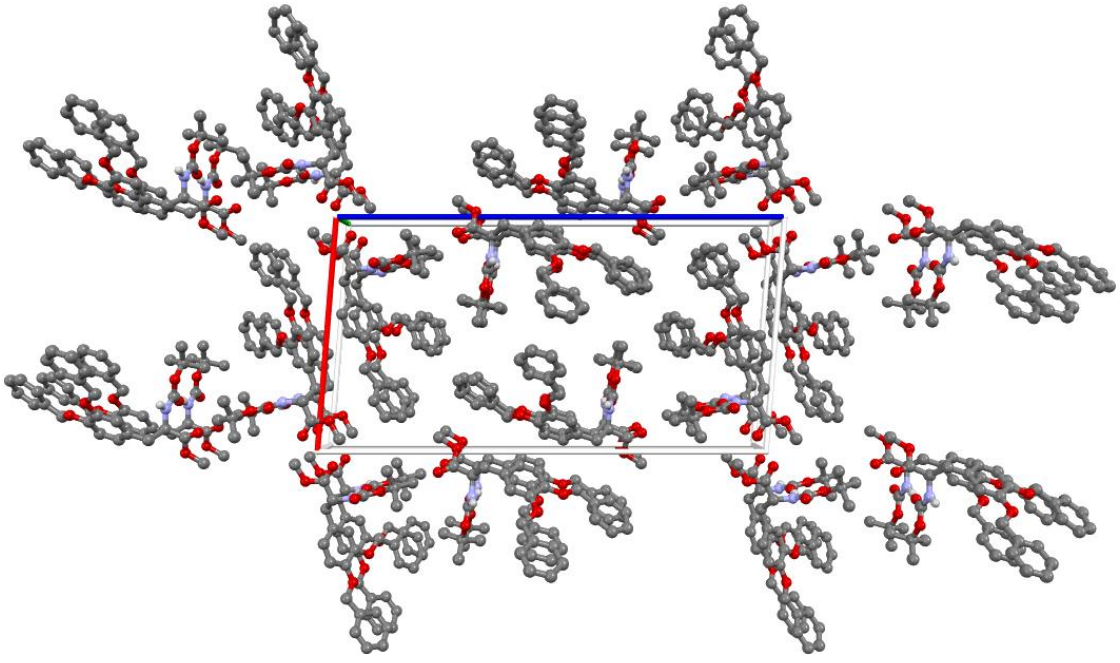

Figure S11. Crystal packing of Boc-L-Dopa(Bn)$_2$-OMe viewed down the b-axis. H_{CH} atoms omitted for clarity.

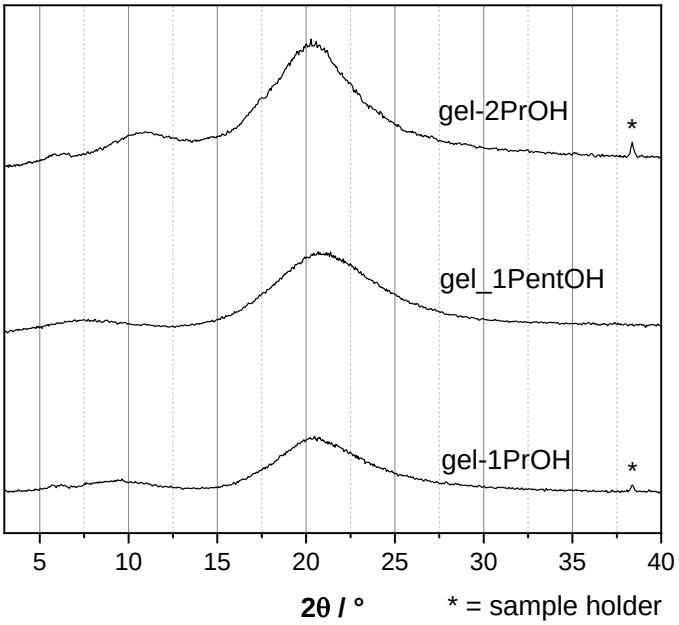

Figure S12. Powder XRD patterns recorded at RT on gels of Boc-L-Dopa(Bn)$_2$-OMe (from the top: **D**, **F**, **E**) obtained from different alcohols.

References.

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