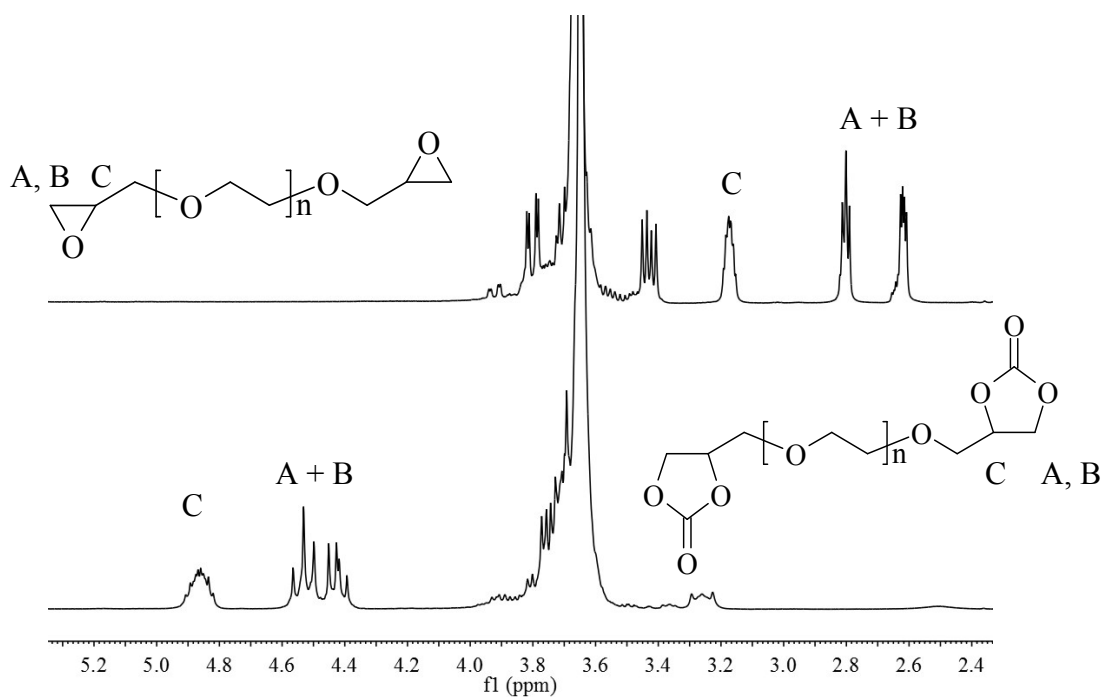


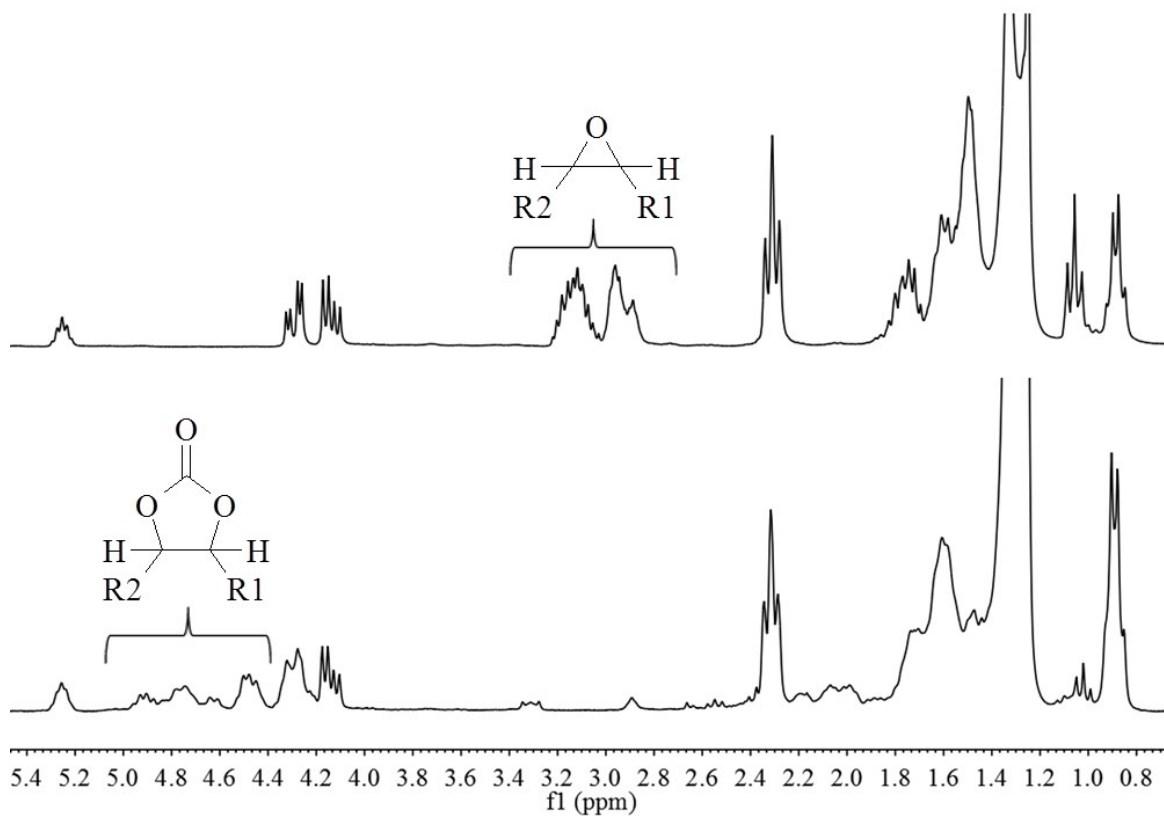
Supporting Information

CO₂-blown microcellular non-isocyanate polyurethane (NIPU) foams: from bio- and CO₂-sourced monomers to potentially thermal insulating materials

B. Grignard ^a, J.-M. Thomassin ^a, S. Gennen ^a, L. Poussard ^b, L. Bonnaud ^b, J.-M. Raquez ^b, P. Dubois ^b, M. -P. Tran ^c, C. B. Park ^c, C. Jerome ^{*a}, C. Detrembleur ^{*a}



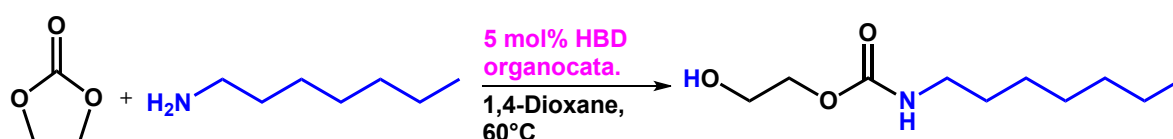
ESI1 : ¹H NMR characterization of poly(ethylene glycol) bis(cyclocarbonate)



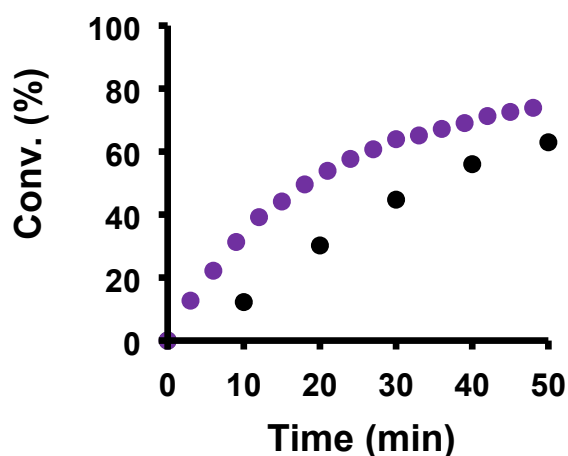
ES12 : ^1H NMR characterization of CSBO

a) Coupling of ethylene carbonate with n-heptyl amine. 1 g of ethylene carbonate (11.35 mmol) was introduced in a glass tube containing 1.68 mL of n-heptyl amine (11.35 mmol), 1.3-bis-(2-hydroxyhexafluoroisopropyl)benzene (0.142 mL, 5 mol%) and 4mL of dioxane. The reaction mixture was then heated to 60°C and the conversion was determined by online Raman spectroscopy using a red laser ($\lambda = 785 \text{ nm}$) according to a procedure described elsewhere.¹ Spectra were recorded every 3 minutes and conversions were determined (after normalization of the Raman spectra) by comparing the evolution of the intensity of the peak characteristic of ethylene carbonate at 716 cm^{-1} with a signal that did not evolve during the reaction ($\nu = 835 \text{ cm}^{-1}$).

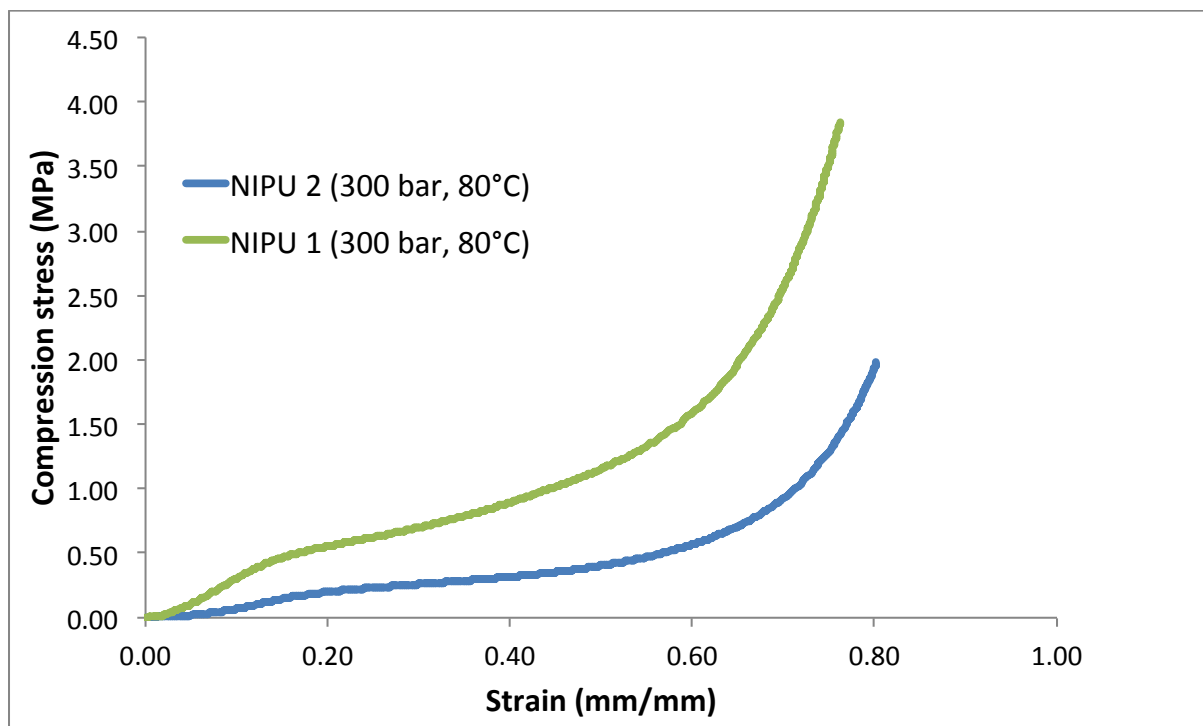
b)



c)



ESI3: a) Experimental section for the coupling of ethylene carbonate with n-heptyl amine in the presence of 1,3-bis(hydroxyhexafluoroisopropyl) benzene as catalyst; b) Reaction scheme for this reaction; c) Comparison of the evolution of the conversion with time for this reaction carried out in the presence (purple) or not (black) of 1,3-bis(hydroxyhexafluoroisopropyl) benzene (5 mol% compared to ethylene carbonate). Conditions: Solvent = dioxane, T = 60°C, [EC] = [n-heptylamine] = 1.76 M.



ESI4: Compression stress/strain curves for NIPU 1 (sample C, Figure 6) and NIPU 2 (sample G, Figure 6) (2 mm/min.).

Reference:

¹ B. Grignard, B. Gilbert, C. Malherbe, C. Jerome, C. Detrembleur, *ChemPhysChem* **2012**, *13*, 2666–2670.