Limonene-based polycarbonates for technical applications

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Biobased polymers are promising alternatives for fossil based polymers. The metal-catalyzed copolymerization of trans-limonene epoxide and CO_2 yields high molecular weight poly(limonene carbonate) (PLimC) with a unique combination of physical and chemical properties.[1] PLimC forms highly transparent coatings, has a glass transition temperature of 135°C is scratch resistant, and shows good selectivity in gas permeation. Most interestingly, the lateral double bond in each repeating unit of PLimC makes it a perfect platform for functional polymers.[2] These double bonds allow a wide variety of chemical modifications of PLimC which result in polymers with a wide variety of novel properties. PLimC shows unique permeation properties in combination with its excellent transparency which allowed the preparation of a completely new class of materials, which we have termed a “breathing glass”.[3]

1) O. Hauenstein, M. Reiter, S. Agarwal, B. Rieger, A. Greiner, Green Chemistry 2016, 18, 760-770.
2) O. Hauenstein, S. Agarwal, A. Greiner, Nature Communication 2016, DOI: 10.1038/ncomms11862.
3) O. Hauenstein M. Rahman, M. Elsayed, R. Krause-Rehberg, S. Agarwal, V. Abetz, A. Greiner Adv. Mater. Techn. 2017 DOI: 10.1002/admt.201700026

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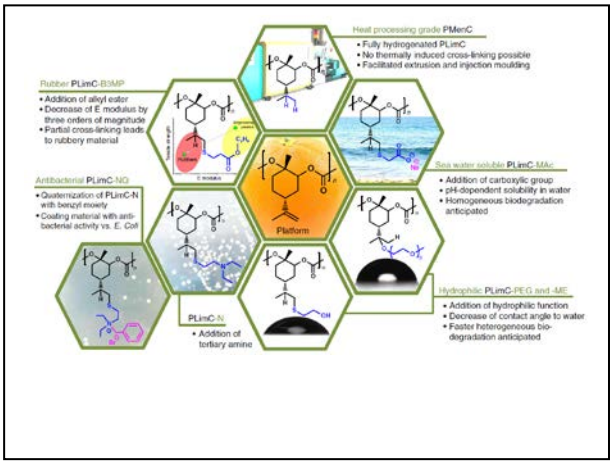

Chemical modification of PLimC.

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