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Challenges in process development and modelling of novel CO_2 based polymers

Sara Ronasi

Norner Research AS, Norway

Carbon dioxide is an abundant, renewable, non-toxic and inexpensive carbon feedstock that can be used for the production of value added chemicals and materials, including plastics. The selective transformation of CO_2 into polymers in the copolymerization with epoxides using a range of homogeneous and heterogeneous catalysts has been known from late 60's. Poly (propylene carbonate) (PPC), made from CO_2 and propylene oxide (PO), is one such polymer showing promising properties for various applications. Development of robust and versatile catalytic systems that are able to work under industrially acceptable conditions while achieving excellent yield and selectivity toward polycarbonates has been the main topic of research in this field in recent years. However, the development of the polymerization process has been lagging behind due to lack of knowledge on the phase behavior, reaction rate, conversion and viscosity evolution during the polymerization. In this regard, computational methods for prediction of these parameters can be helpful but still experimental data are necessary as an input for model development and model application in process design. In this work, different in-situ measurement techniques (ATR-FTIR, Raman spectroscopy, viscosity and density) were used to characterize the process parameters. Empirical models based on polymerization tests done in industrially relevant bench scale set-up operated in a semi-continuous mode were developed and challenges in quantification and modelling of this process are discussed.

Biography

Sara Ronasi has completed her PhD and Post-doctoral studies from University of Lorraine in France, Nancy. She is a Senior Researcher at Norner Research and a global R&D partner in polymer and plastic industry. She is Expert in Chemical Engineering, Project Manager and responsible for process development using CO_2 as a feedstock for novel polyols and polymers in Norner.

sara.ronasi@norner.no

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