

Phosphorus-containing Zeolites for Renewable *p*-xylene

Scientific Achievement

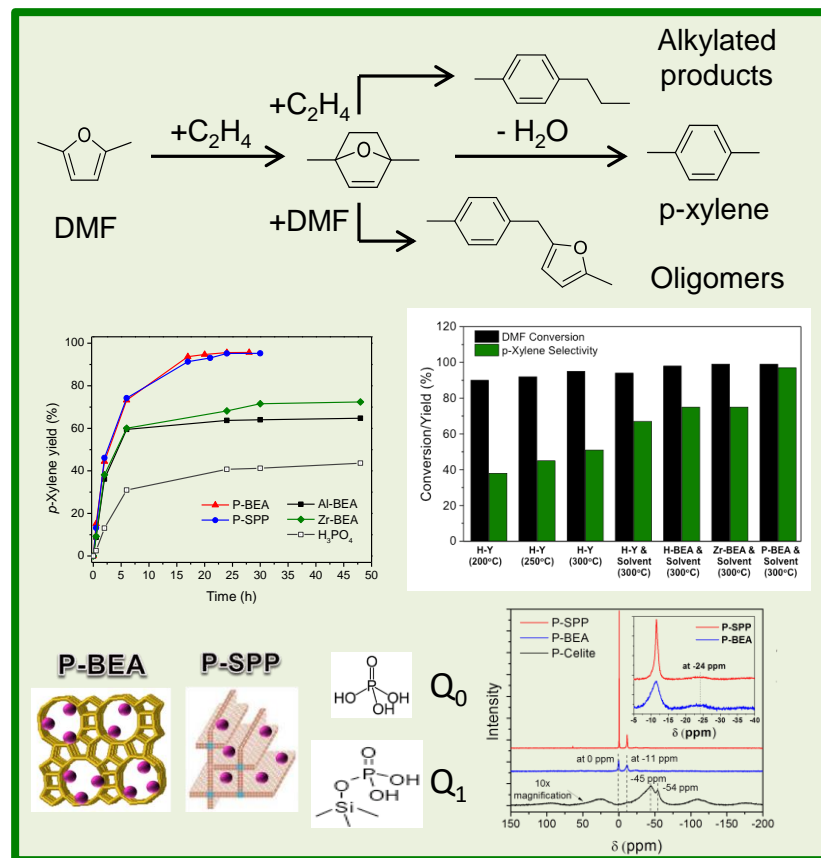
Phosphorus-containing zeolites (P-BEA and P-SPP) exhibited unprecedented *p*-xylene yield of 97% for tandem Diels-Alder cycloaddition and dehydration of 2,5-dimethylfuran (DMF) and ethylene.

Significance and Impact

- *P*-xylene is a major commodity chemical for the production of polyethylene terephthalate (PET).
- Phosphorus-containing siliceous zeolites establish a commercially attractive process for renewable *p*-xylene production.

Research Details

- Homogeneous H_3PO_4 gave only 41% yield of *p*-xylene, indicating supported phosphoric acid is fundamentally different from the homogeneous acid.
- The outstanding performances of P-BEA and P-SPP can be attributed to unique acid properties that can catalyze the cycloadduct dehydration without catalyzing the side reactions.
- This behavior is distinct from that of Al-containing zeolites, worthy of further investigation for other dehydration and acid catalyzed reactions.



H. J. Cho, L. Ren, V. Vattipalli, Y.-H. Yeo, N. Gould, B. Xu, R. J. Gorte, R. Lobo, P. J. Dauenhauer, M. Tsapatsis and W. Fan* *ChemCatChem*, 2016