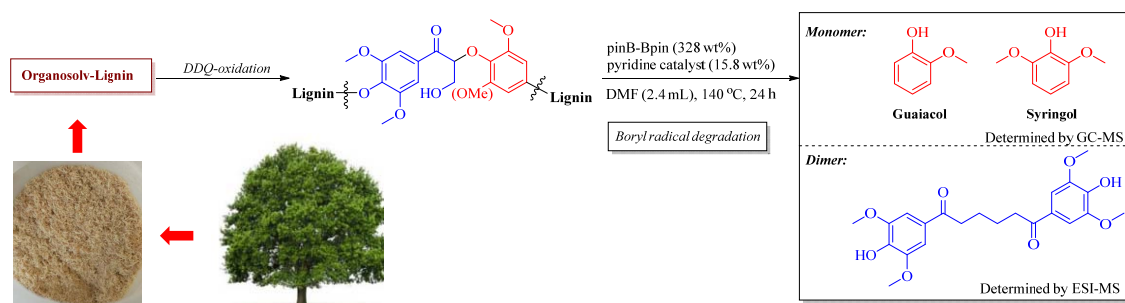


BORYL RADICAL MEDIATED LIGNIN DEGRADATION: DEPOLYMERIZATION AND RECONNECTION

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Chemo-degradation of lignin has attracted increasing interest due to its potential in providing sustainable valorization approaches for producing lignin-derived chemicals from biomass [1]. Addressing the challenge in cleaving the C-O ether bond of lignin a two-step sequential procedure has been developed combining the selective oxidation of primary or secondary alcohol in β -O-4 linkages followed by degradation [2]. In this talk, we will present this new transition metal free degradation procedure utilizing DDQ-oxidation and boryl radical mediated degradation, in which a new lignin-derived dimer was produced (Scheme 1). Our results include the efficient degradation of oxidized β -O-4 model compounds by boryl radical initiated by stoichiometric of bispinacolborane and catalytic amount of 4-(4-pyridinyl)-benzotrile as well as its application to organosolv-lignin. This sequential procedure expands the tool box for lignin degradation from simple depolymerization to high-value products by simultaneous bond forming transformations.



Scheme 1. Schematic representation of the sequential degradation procedure.

[1] Z. Sun, B. Fridrich, A. de Santi, S. Elangovan, K. Barta, *Chem. Rev.* **2018**, *118*, 614–678.

[2] (a) A. Rahimi, A. Azarpira, H. Kim, J. Ralph, S. S. Stahl. *J. Am. Chem. Soc.* **2013**, *135*, 6415–6418. (b) A. Rahimi, A. Ulbrich, J. J. Coon, S. S. Stahl. *Nature*, **2014**, *515*, 249–252. (c) C. S. Lancefield, O. S. Ojo, F. Tran, N. J. Westwood, *Angew. Chem. Int. Ed.* **2015**, *54*, 258–262. (d) C. Zhang, H. Li, J. Lu, X. Zhang, K. E. MacArthur, M. Heggen and F. Wang, *ACS Catal.* **2017**, *7*, 3419–3429. (e) I. Bosque, G. Magallanes, M. Rigoulet, M. D. Karkas and C. R. J. Stephenson, *ACS Cent. Sci.* **2017**, *3*, 621–628.