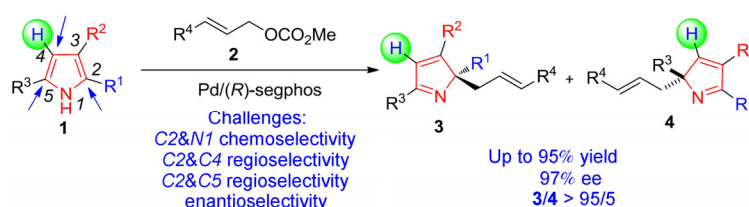


## Highly regio- and enantioselective synthesis of chiral polysubstituted 2*H*-pyrroles

As one of the most important five-member heterocyclic aromatic rings, pyrrole is widely distributed in numerous natural products and pharmaceutical agents. Asymmetric dearomatization of pyrroles is very attractive in organic synthesis given the fact that highly functionalized chiral pyrrolines and pyrrolidines could be easily accessed from the readily available pyrroles. However, the reported asymmetric dearomatization reactions of pyrroles are limited to transition-metal-catalyzed [4+3] cycloaddition and hydrogenation reactions. The enantioselective intermolecular alkylative dearomatization of pyrroles is rare and challenging due to multiple selectivity issues including the chemoselectivity (C2&N1), regioselectivity (C2&C4, C2&C5) and enantioselectivity (Scheme 1) [1].

During the past few years, the You group from Shanghai Institute of Organic Chemistry has focused on the transition-metal-catalyzed asymmetric allylic dearomatization reactions [2]. Recently, the researchers in this group found

that highly enantioenriched poly-substituted 2*H*-pyrroles could be easily accessed via Pd-catalyzed intermolecular asymmetric allylic dearomatization reaction of polysubstituted pyrroles (Scheme 1). With the commercially available palladium precursor and chiral ligand, various poly-substituted 2*H*-pyrrole products containing a chiral quaternary carbon center were obtained with up to 97% ee under mild reaction conditions. Interestingly, they found the reaction occurred smoothly to give good to excellent regioselectivities when tri-substituted and tetra-substituted pyrrole derivatives were used. In addition, chiral pyrrolines and cyclic imines could be conveniently prepared by selective reductions of the enantioenriched 2*H*-pyrrole products, further demonstrating the synthetic utility of this newly developed method. Moreover, this reaction represents the first example involving the multi-substituted pyrroles as prochiral nucleophiles in Pd-catalyzed asymmetric allylic alkylation reactions.



**Scheme 1** Pd-catalyzed intermolecular asymmetric allylic dearomatization reaction of pyrroles.

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