Organocatalyzed Asymmetric Michael Addition of Ketones and Nitrostyrenes

Significance: The polyacrylonitrile-fiber-supported chiral pyrrolidine catalyst 1, prepared as shown in eq. 1, promoted the asymmetric Michael addition of cyclohexanone to trans-β-nitrostyrenes in water to give the corresponding Michael adducts in 83–96% yield, a syn/anti ratio of 92:8 to 98:2, and 83–99% ee (eq. 2; 11 examples).

Comment: Catalyst 1 was characterized by FTIR, SEM, and elemental analyses. When a silica column packed with catalyst 1 was used in a flow reaction of cyclohexanone with [(E)-2-nitrostyryl]benzene, its catalytic performance was comparable with those observed in the batch reaction. The column-packed catalyst was reused three times without significant loss of its catalytic activity (fresh: 68% yield, syn/anti = 97:3, 99% ee; third reuse: 63% yield, syn/anti = 95:5, 99% ee).