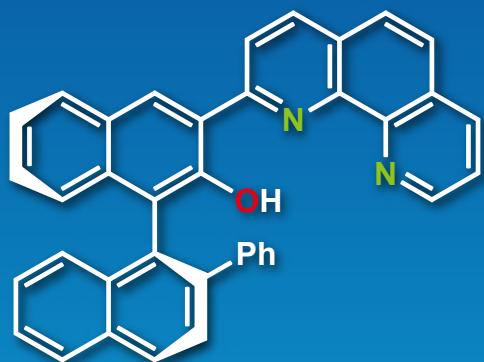


New

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# Chiral Phenanthroline Ligand for Asymmetric Metal Catalysis

## (S)-BinThro



[P2599]

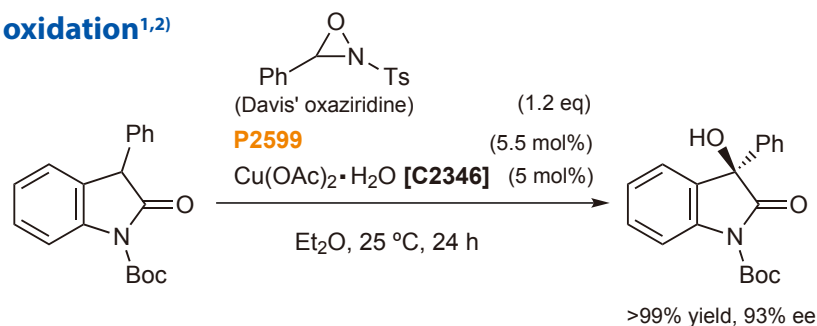
### Advantages

- Axially chiral *N,N,O*-tridentate ligand
- Forms coordination complexes with various metal ions
- Usable for several enantioselective reactions

### Applications

**P2599** is a phenanthroline ligand bearing an axially chiral binaphthyl backbone, developed by Naganawa and Nishiyama *et al.* **P2599** has three donor atoms (*N,N,O*) of the phenanthroline moiety with a phenolic hydroxyl group. As phenanthroline possesses greater coordination ability with various ions, **P2599** can be applied to a broad range of asymmetric metal catalysts ( $\text{Cu}^{1-3}$ ,  $\text{Rh}^{1,4}$ ,  $\text{Ni}^{1,5}$ ,  $\text{Zn}^{1,6}$ ) and several enantioselective reactions.

#### Asymmetric Davis oxidation<sup>1,2)</sup>



#### Procedure

To a mixture of **P2599** (2.9 mg, 5.5 mol) and  $\text{Cu}(\text{OAc})_2 \cdot \text{H}_2\text{O}$  (1.0 mg, 5.0 mol) in a Schlenk tube under Ar atmosphere, dry diethyl ether (1 mL) is added at 25 °C. After stirring for 1 h at 25 °C, the oxindole (30.9 mg, 0.1 mmol) is added portion-wise to the mixture. After stirring another 5 min, Davis' oxaziridine (33.0 mg, 0.12 mmol) is added portion-wise to the mixture and stirred for 24 h at the same temperature. The catalyst is removed by passing through short column chromatography on silica gel (eluting chloroform) and the solvent is evaporated. The residue is purified by column chromatography on silica gel (eluting hexane/EtOAc) to give the desired oxidation product (>99% yield, 93% ee).

- 1) Y. Naganawa, H. Nishiyama, *Chem. Rec.* **2016**, 16, 2573.
- 2) Y. Naganawa, T. Aoyama, H. Nishiyama, *Org. Biomol. Chem.* **2015**, 13, 11499.
- 3) Y. Naganawa, T. Aoyama, K. Kato, H. Nishiyama, *ChemistrySelect* **2016**, 1, 1938.
- 4) Y. Naganawa, T. Namba, M. Kawagishi, H. Nishiyama, *Chem. Eur. J.* **2015**, 21, 9319.
- 5) Y. Naganawa, H. Abe, H. Nishiyama, *Synlett* **2016**, 27, 1973.
- 6) Y. Naganawa, T. Namba, T. Aoyama, K. Shoji, H. Nishiyama, *Chem. Commun.* **2014**, 50, 13224.

**P2599 (S)-BinThro**

20mg



# Chiral Phenanthroline Ligand for Asymmetric Metal Catalysis: (S)-BinThro

## Introduction of the Researcher



**Yuki Naganawa**  
Researcher  
National Institute of  
Advanced Industrial Science  
and Technology (AIST), Japan

### [Academic Career]

- Apr. 2011 Postdoctoral Research Associate at Kyushu University (Prof. T. Katsuki)
- Jun. 2012 Assistant Professor at Nagoya University (Prof. H. Nishiyama)
- Apr. 2016 Research Associate at the University of Tokyo (Prof. S. Sando)
- Apr. 2017 - present  
Researcher at Interdisciplinary Research Center for Catalytic Chemistry of AIST

### [Honors]

- 2012 28th Inoue Research Award for Young Scientists
- 2012 Reaxys Ph.D Prize Finalist
- 2015 Asian Core Program/Advanced Research Network Lectureship Award (Taiwan)
- 2016 The Incentive Award of Tokai Branch, The Society of Synthetic Organic Chemistry, Japan



**Hisao Nishiyama**  
Emeritus Professor  
Nagoya University, Japan

### [Academic Career]

- Apr. 1985 Associate Professor at Toyohashi University of Technology
- Apr. 1996 Professor at Toyohashi University of Technology
- Sep. 2002 Professor at Nagoya University
- Apr. 2016 - present  
Emeritus Professor at Nagoya University

### [Honors]

- 1984 The Award for Young Chemists from the Chemical Society of Japan
- 1996 and 2015  
The Award of The Society of Synthetic Organic Chemistry, Japan

### [TCI Mail Article]

- Jan. 2017 Contributed his article "Asymmetric Catalysis with Chiral Bis(oxazolinyl)phenyl Transition-metal Complexes" to TCI Mail No.172

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