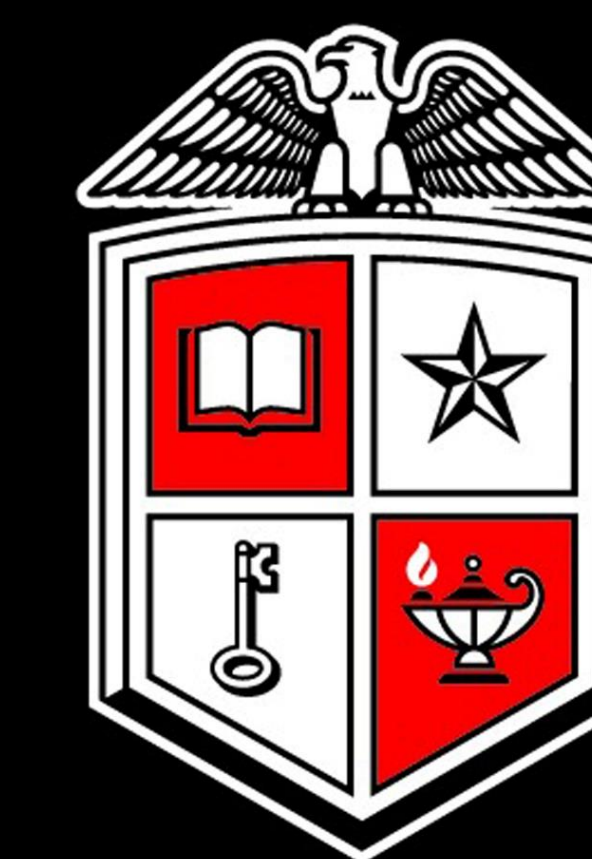


# Discovery of Multi-Layer 3D Chirality and its Enantioselective Assembly

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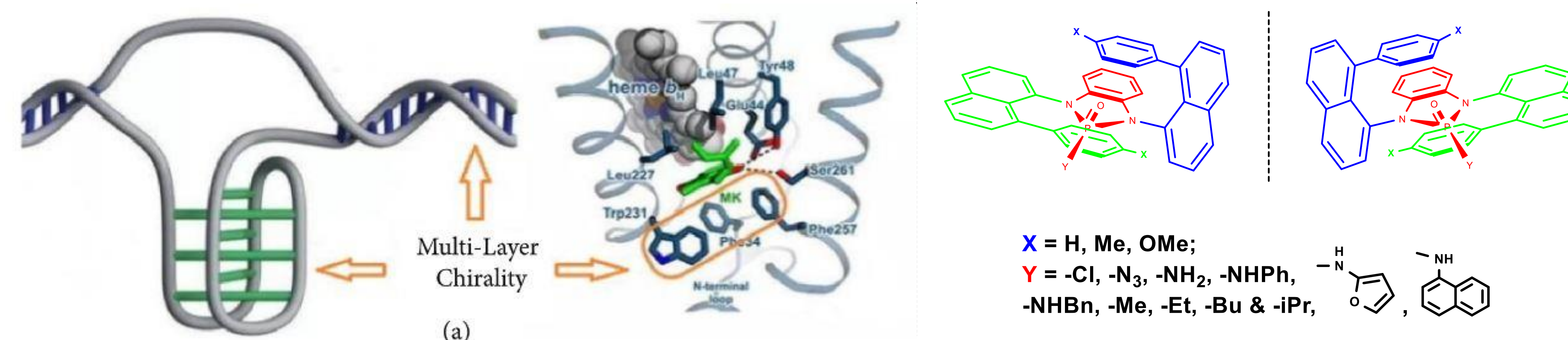
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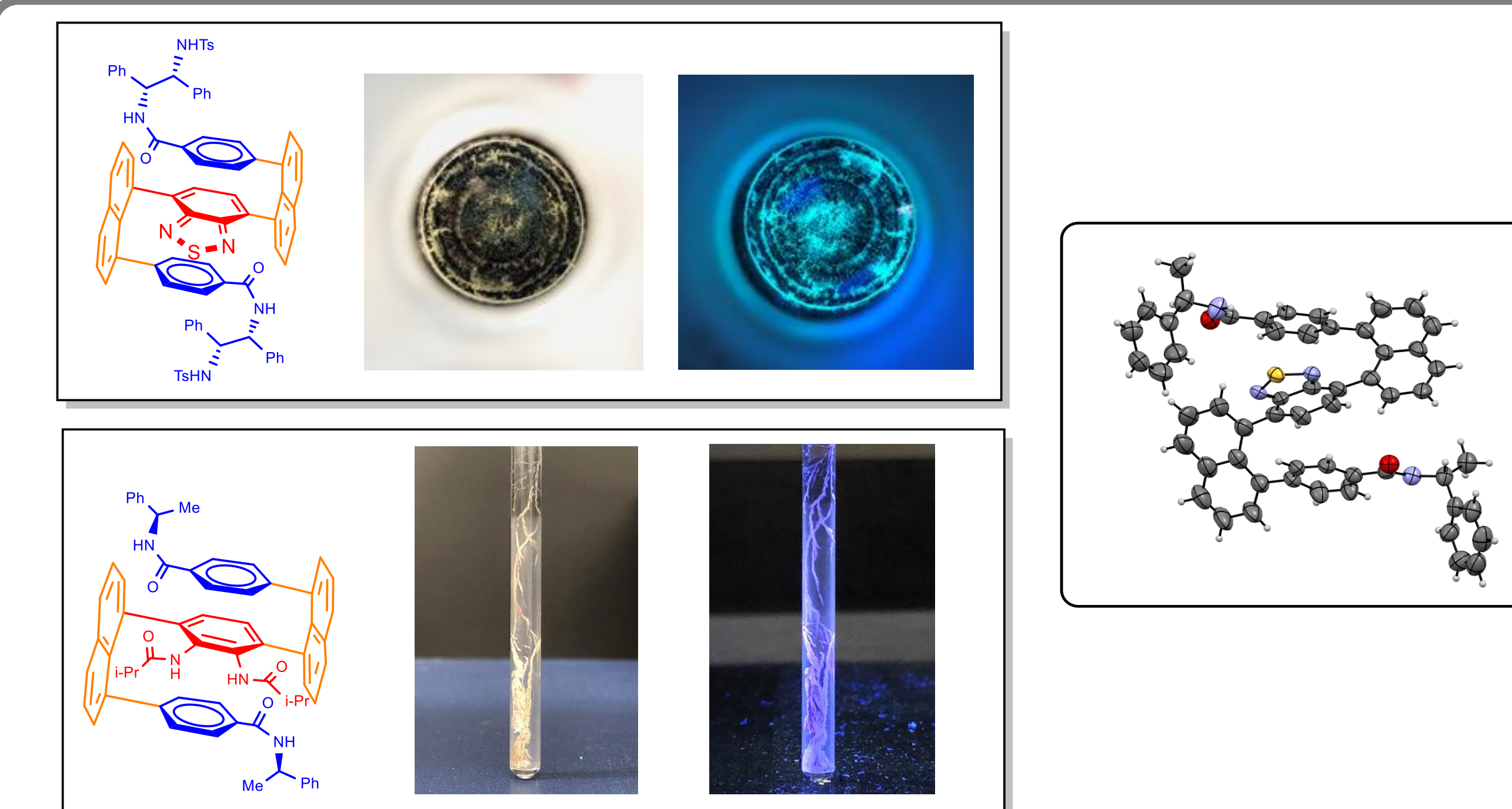
## Introduction

An unprecedented and novel organic sandwich chirality showing multilayer three dimension was discovered. The key element of this chirality is characterized by three layers of structures that are arranged nearly in parallel fashion with one on top and one down from the center plane. Also, we have established the first enantioselective total synthesis of sandwich-shaped organic targets of multi-layer 3D chirality through Asymmetric dual Suzuki-Miyaura couplings by taking advantage of chiral amide-derived boronic acids.

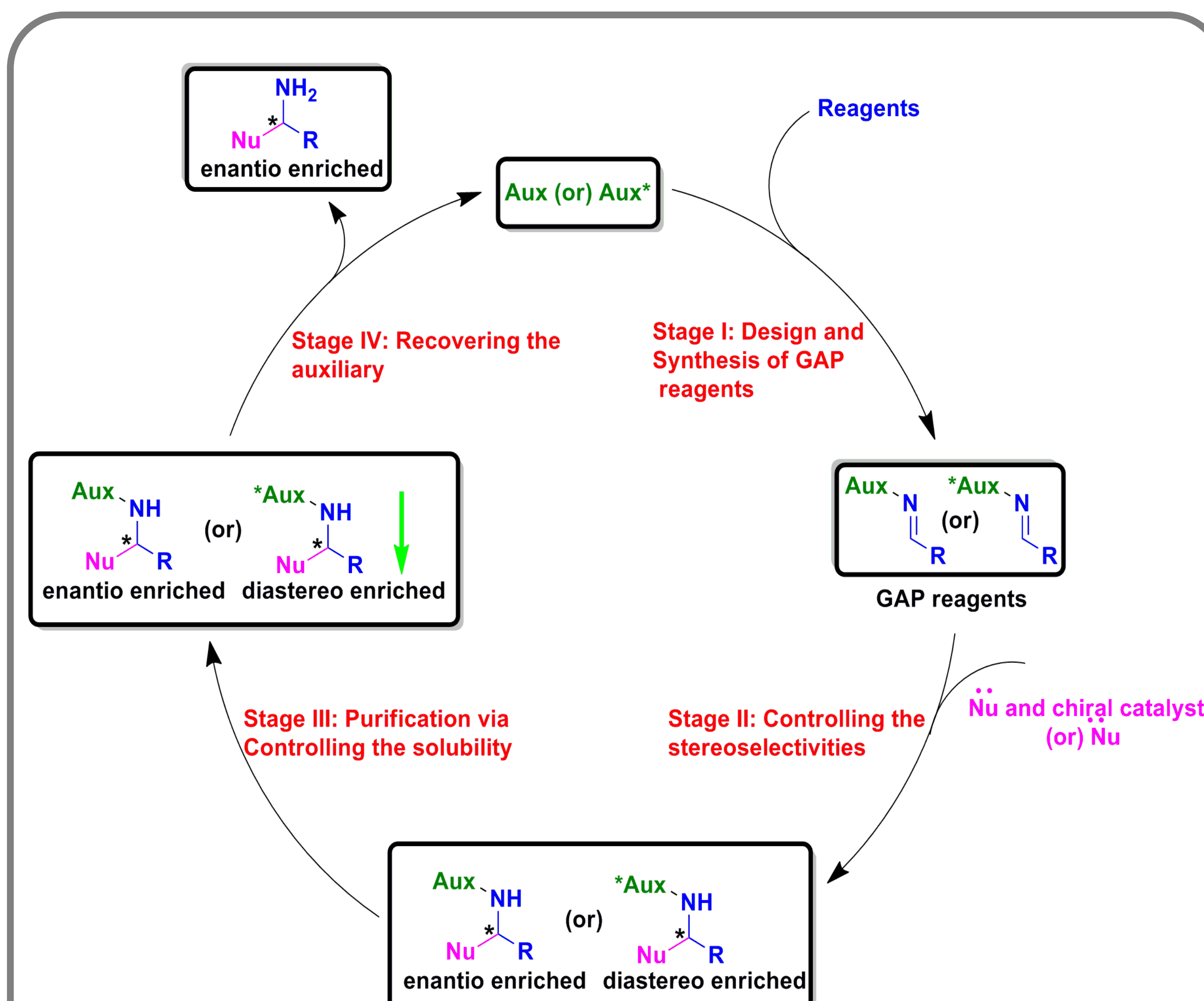
## Multilayer 3D Chirality



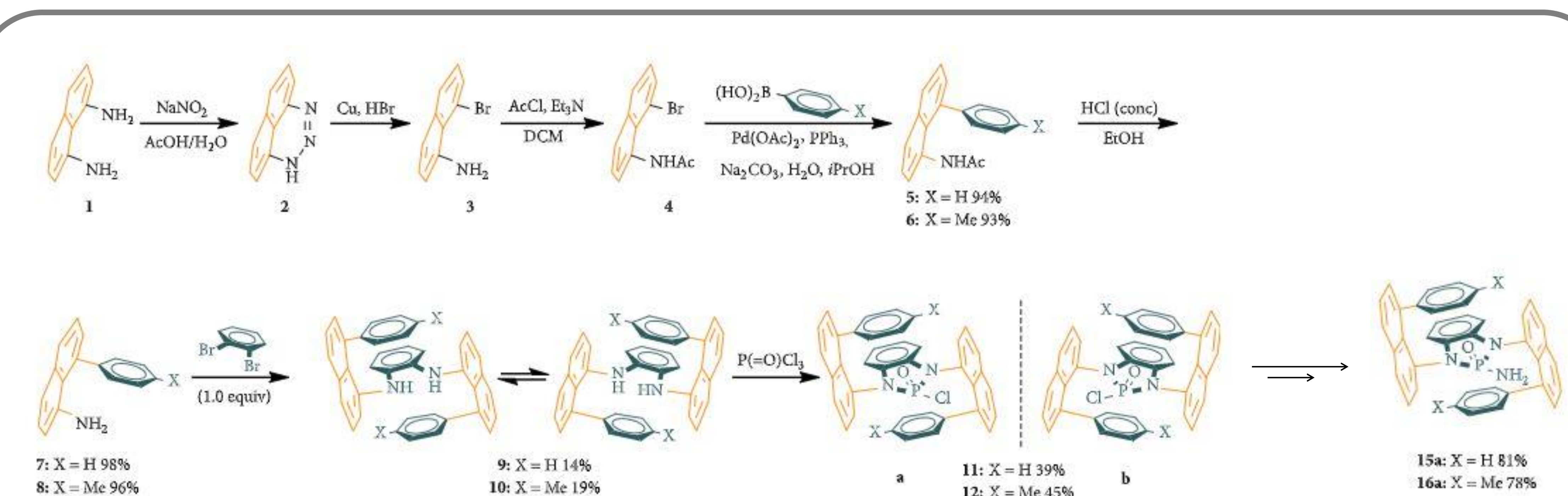
## Spiro textile-type of macro-chirality



## Group Assisted Purification Chemistry

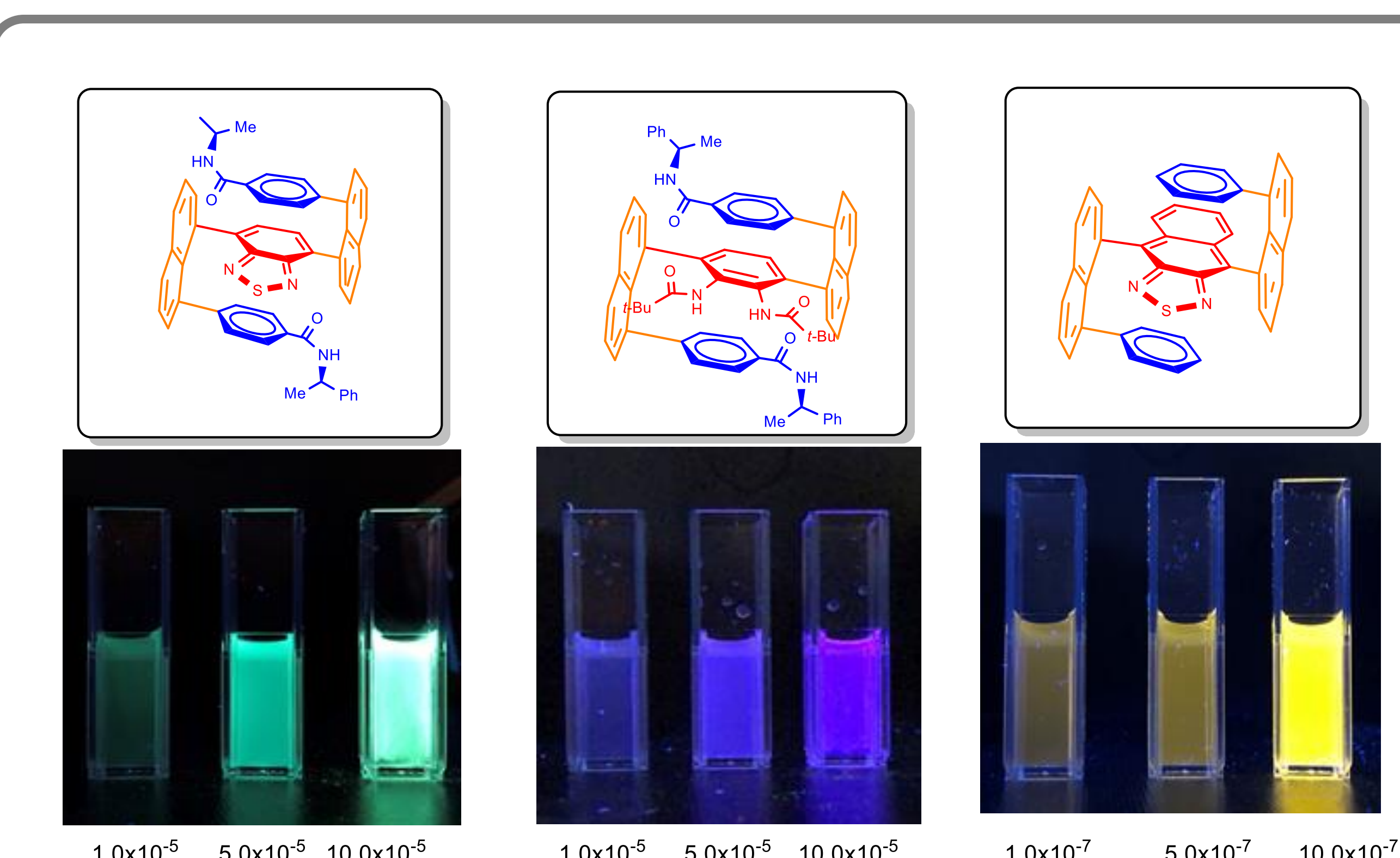


## First Assembly of Multi-Layer 3D Chirality



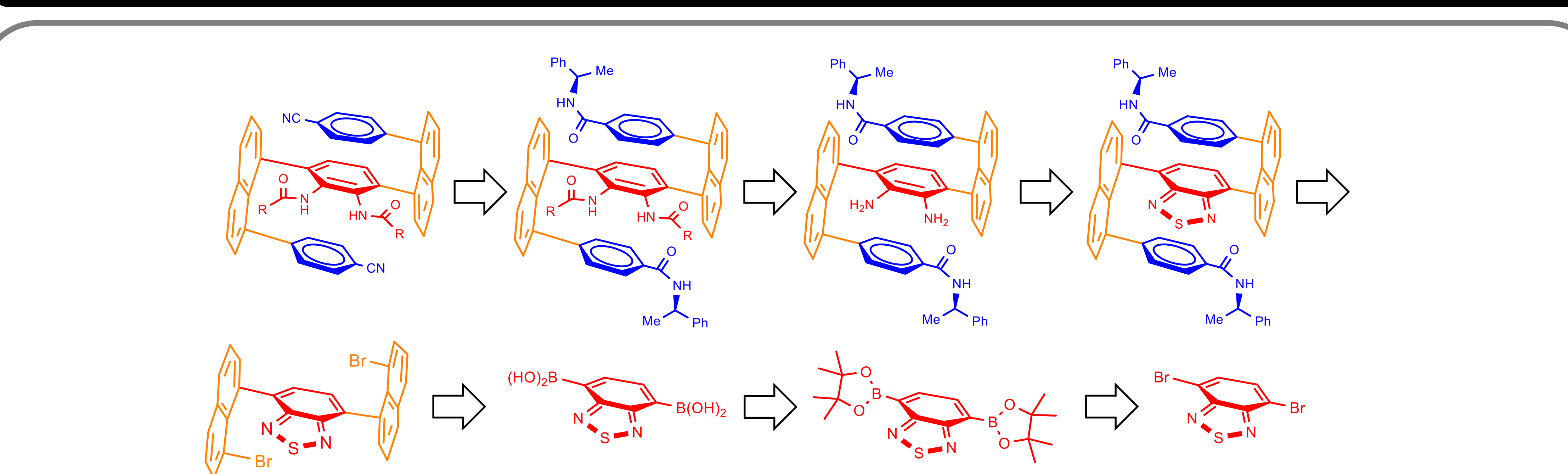
The key characteristics of this chirality are shown by three levels of planar units arranging nearly in parallel fashion with one on top and the other one down from the central layer, and by its unique pseudo C<sub>2</sub> symmetry which is made possible by differentiating moieties on phosphorous on N-phosphonyl ring.

## Fluorescence Quality



Qualitative examination of fluorescence sensitivity was conducted on randomly selected samples in NMR tubes with CDCl<sub>3</sub> as solvent.

## Enantioselective Assembly of Multi-Layer 3D Chirality



The first enantioselective assembly of sandwich-shaped organo molecules has been achieved by conducting dual asymmetric Suzuki-Miyaura couplings and nine other reactions. This work also presents the first fully C-C anchored multi-layer 3D chirality with optically pure enantiomers.

## References

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2. G Wu, Y Liu, Z Yang, T Jiang, N Katakam, H Rouh, L Ma, Y Tang, S Ahmed, A Rahman, H Huang, D Unruh, and G Li, *National Science Review*, **2020**, 7 (3), 588-599.
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