Predictably synthesizing a library of white-light-emitting perovskites

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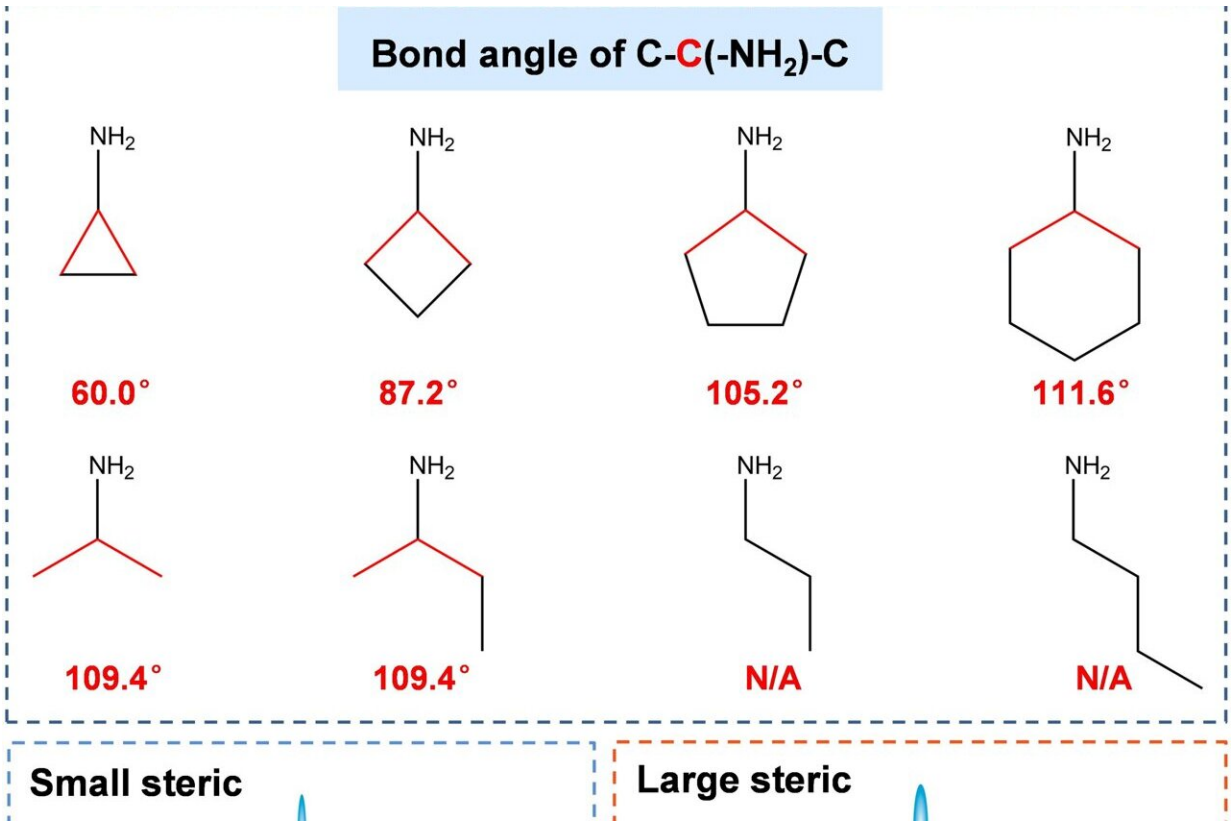

Predictably synthesizing broadband white-light-emitting perovskites by steric hindrance regulation strategy. Credit: Science China Press

A steric hindrance regulation strategy was developed to predictably synthesize broadband white-light-emitting perovskites. This study was

led by Prof. Jun Xing (College of Chemistry and Molecular Engineering, Qingdao University of Science & Technology) and Prof. Weigao Xu (School of Chemistry and Chemical Engineering, Nanjing University).

The authors reveal the effect of molecular configuration on the structural distortion of perovskites and pioneer a steric hindrance regulation strategy to predictably synthesize broadband white-light-emitting perovskites. Typically, the spacing molecules containing C-C(-NH_2)-C group were applied to synthesize 2D perovskites, which bring large steric hindrance in the in-plane orientation and induce structural distortion.

The degree of structural distortion in the perovskite could be regulated by controlling the C-C(-NH_2)-C bond angle of the molecule, which determines the free excitons self-trapping. The synthesized perovskites exhibit tunable broadband emission covering from 400 to 800 nm, and the bigger molecular steric hindrance induces the larger structural distortion and the higher rate of excitons self-trapping, which therefore results in cool- to warm-white-light.

According to this strategy, the functional molecules can be extended to secondary and tertiary amines with group C-NH_x-C, and 40 kinds of perovskites with broadband emission were successfully fabricated. This work opens a general way to the directed synthesis of abundant white-light-emitting perovskites and uncovers the molecular steric hindrance-structural distortion-STEs relationship in the perovskites.

The paper is published in the journal *Science China Chemistry*.

More information: Ludan Niu et al, Predictably synthesizing a library of white-light-emitting perovskites, *Science China Chemistry* (2023). DOI: 10.1007/s11426-022-1513-8

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