Exploring the size dependence of circularly polarized luminescent materials

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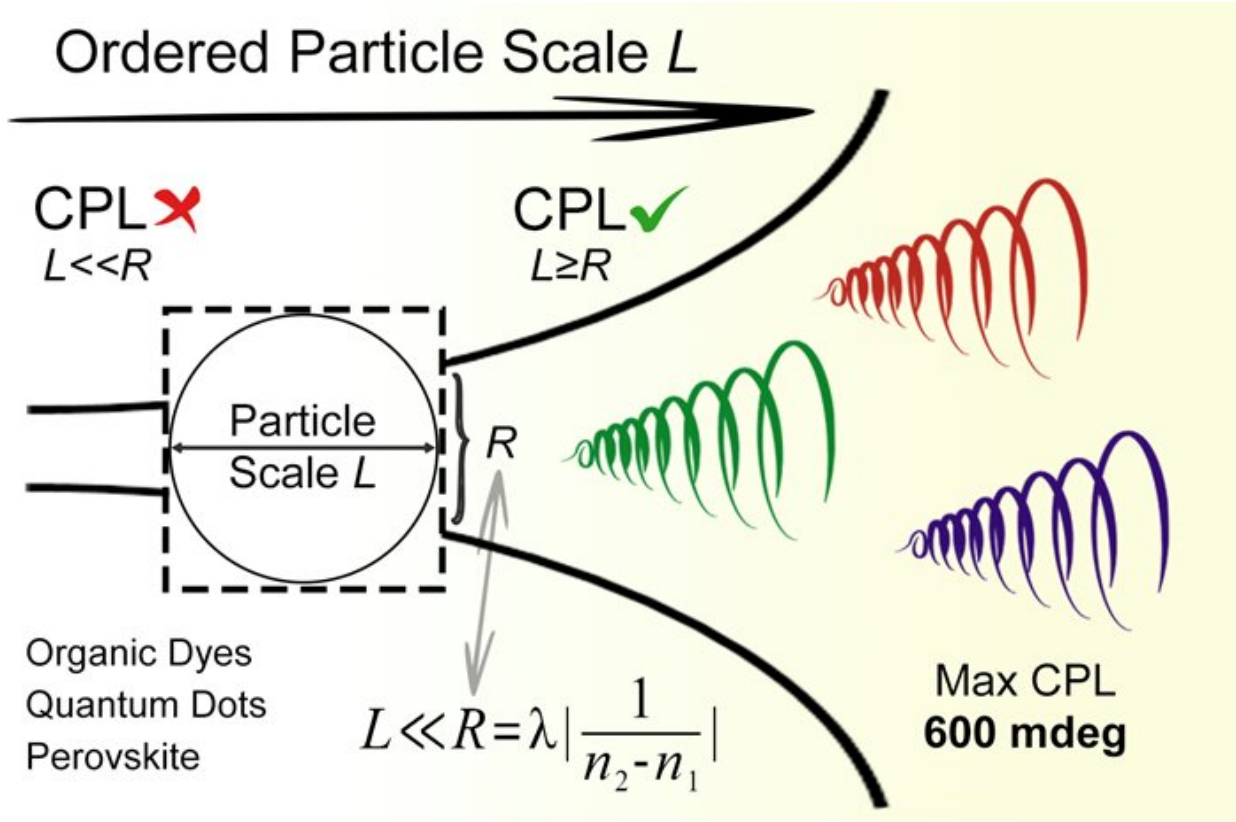


A schematic diagram of the scale-effect model based on scalar theory. Credit: Science China Press

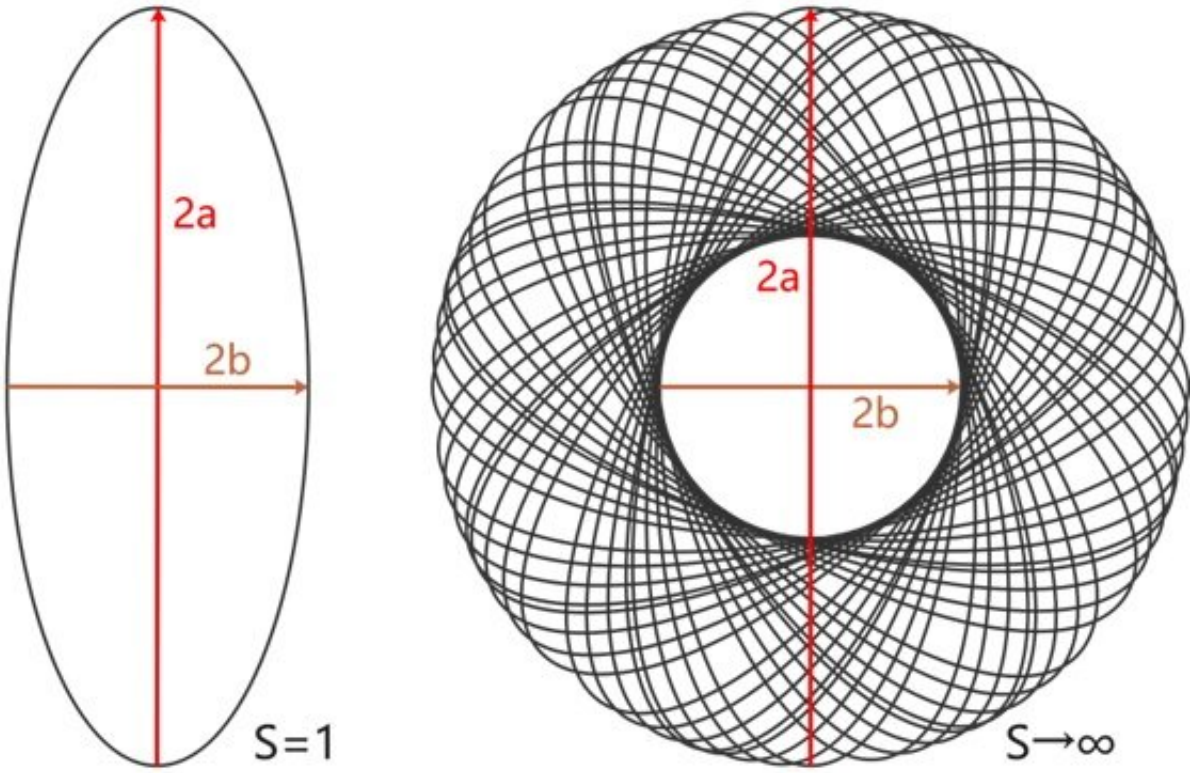
In the development of chiral materials, electron microscopy, polarimeters, or other spectroscopic methods are commonly used to

analyze and discuss the chirality or asymmetry of materials. With the continuous development of circularly polarized luminescence (CPL) spectroscopy, CPL spectroscopy has become an important technique for characterizing the chirality of luminescent materials.

Studies have shown that in addition to chiral structures inducing CPL luminescence, non-chiral ordered structures can also have a significant impact on CPL signals. These non-chiral structures mainly affect CPL signals at the micro or macro particle scales, and it is difficult to express their influence on CPL signals through simple universal macroscopic measurement methods.

Recently, based on research results in the fields of polarized light and molecular spontaneous radiation, Professor Xiang Ma's research group in East China University of Science and Technology designed experiments and established a model based on the scale effect of ordered media to quantify the influence of media order on the CPL signal.

Compared with CPL emission induced by the potential chiral excited state of molecules, the scale effect of ordered media on the CPL signal of luminescent materials is also significant. The study also found that the measurement entropy in CPL measurement is the dominant factor determining the isotropy and anisotropy of CPL signals.



For the superposition state of many EPL, they represent an anisotropic measurement characteristic depending on the long axis and short axis of the corresponding ellipse. The isotropic measurement characteristic could represent the condition when the measurement entropy is large. Credit: Science China Press

L is the transmission distance (anisotropic scale) in a uniform medium, and R is the critical scale of the scale effect. When L