Aggregation-Induced Emission (AIE) phenomenon: organic molecules shine with a new "light"

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Light is one of the most indispensable elements to the earth and humankind. It is a form of energy that can be produced either by incandescence or luminescence. The luminescent processes are several and each of them constitutes a specific field of study in science. Photoluminescence has always been a wide-studied phenomenon, it is related to the production of light from an excited state of a molecule that can be either organic or inorganic. Since 1950s the attention to the photoluminescence of organic molecules has grown significantly and scientists tried to employ organic molecules as luminophores in all those applications where inorganic systems were being successfully employed. However, the attention was focused on flat condensed aromatic hydrocarbons that were featured of the Aggregation-Caused Quenching (ACQ) phenomenon, because of which, the luminescence is quenched in aggregate conditions. For many years this has been a thorny problem apparently without solution. The turning point arrived in 2001 when Prof. Tang and his group were able to decipher an uncommon phenomenon according to which, molecules with a particular structure were able to emit light in aggregate state but not in solution. The knowledge of this opened a new chapter in the understanding of the photonphysics of organic molecules and made possible the employments of them in all those fields where the successful use of organic systems seemed impossible.

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