"Transparent Intelligence" for Sustainable Development

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Abstract

Transparent materials are essential in everyone's life. They enable daylight to reach the interior of buildings, thereby contributing to both our physical and mental well-being; they are the primary component for communication via optical fibers and a key component in electronic devices such as protective cover and/or dielectric material; and they enable clean energy production through solar panels or algae reactors by acting as protective and light transmitting barriers. Adding functions to transparent materials in an intelligent way creates further opportunities to use and enhance the beneficial impacts of transparency. The concept *Transparent Intelligence* covers transparent materials and products with integral intelligent functions – passive, active or interactive. By using Transparent Intelligence it is possible to embrace many of the societal challenges that we are facing today. The concept can be divided into five broad industrial sectors: Built Environment, Information and Communication Technologies (ICT), Solar Energy, Mobility, and Materials. A perspective on how Transparent Intelligence can improve the sustainable development of our world will be presented, using examples of electrochromic windows for energy-efficient buildings, photocatalytic coatings for improved indoor air quality, transparent conductive coatings for antennas, bandpass filters for mobile phone indoor coverage, UV down-converting components for efficient solar energy, hygienic surfaces for infection mitigation on electronic devices, printed electronics for sustainable glass packaging, and IR-reflecting coatings for fire safety.

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