

Scientists develop unclonable security ink

By Jyoti Singh

Twitter: @ashajyoti11

New Delhi, December 23 (India Science Wire): Researchers from Council of Scientific and Industrial Research- National Physical Laboratory (CSIR-NPL) have developed an ink that may help in combating the problem of counterfeiting of currency notes, fake printing of passports and pharmaceuticals. The ink is a single excitable dual emissive luminescent pigment for the formulation of unclonable security ink. This new advanced security feature of the ink has been demonstrated to make it highly suitable for the printing of the valuable products for their protection against duplicity.

The formulation of the single excitable dual emissive luminescent pigment is based on the unexplored combinatory concept of the fluorescence and phosphorescence phenomenon, which provides a new feature in the composite. Both fluorescence and phosphorescence are spontaneous emissions of electromagnetic radiation. There is difference between both that is the glow of fluorescence stops right after the source of excitatory radiation is switched off. An afterglow with durations of fractions of a second up to hours can occur in case of phosphorescence.

“Normally dual colour emission needed dual excitation wavelength but in our present study we have shown a compound which has rarely exists and not reported in literature till date which has dual features in single excitation. It means that reported compound in literature emits intense red color (611 nm) upon 254 nm excitation source and long persisting green color (532 nm) when the excitation source is switched off” said Dr. Bipin Kumar Gupta, Senior Scientist and researcher from CSIR-NPL.

To study the feasibility of the ink for commercial applications has been tested with different parameters. The patterns printed using this ink were not only subjected to rigorous atmospheric conditions such as hot, cold and humid conditions for six months but also examined after treatment with various bleaching agents (ethyl alcohol, ethyl acetate, xylene, acetone, soap solution and laundry detergent) to ensure their chemical stability. The security features printed using the single excitable dual emissive luminescent security ink was found to be very stable against all of these stringent conditions. Hence, the exceptional results obtained using this security ink offer a new pathway to prevent counterfeiting by generating advanced security features.

The immediately formulated single excitable dual emissive luminescent security ink and after six month of its storage exhibit almost same viscosity, which confirms that it is storable for longer duration without undergoing any significant change in its properties. “The alternate on and off of excitation source, the dual color can be easily distinguished by naked eye under the ambient conditions which is difficult to counterfeit but easy to detect that could be helpful to stop the counterfeiting problem of currency , passport and many important documents” told Dr Kumar.

The paper has been published in Journal of *Materials Chemistry C*. (India Science Wire)

Keywords: counterfeiting, unclonable security ink, CSIR-NPL