

International Conference on

Industrial Chemistry

June 27-28, 2016 New Orleans, Louisiana, USA

6HOHFWLYH GLWFKHU XVLQJ D PHFKDQLFDO GULOOHU DQG DQ

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Selective ditcher for sugar cane plantings. The proposed scheme is based on a mechanical driller, which is used to make a ditch where a seed can be planted. An infrared electronic beam is used to detect sugar cane plants, which are remained from the previous crop. The main objective of the proposed implement is to prepare the field to re-populate the current crop and to preserve the existing strain. The driller is based on a commercial and customized mechanical transmission, which is coupled to a tractor's motor using metal chains and gears. The proposed ditcher was mounted in a metallic base, which can be elevated and pulled by a tractor. Infrared beam circuit sends visual and audible warnings to a human operator when a sugar cane plant is detected. Different visual and audible warnings are sent to the operator when a sugar cane plants are not detected within pre-established time window. This circuit uses a 38 kHz carrier signal to reduce a possible false triggering caused by daylight, also the optical detector can discriminate small objects like dead branches and leaves.

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Aggregation and photophysical properties of rhenium(I) supramolecules

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A burst of research activity is witnessed in the area of aggregation-induced emission enhancement (AIE(E)) of luminescent materials because of their potential applications in organic light-emitting diode (OLED), bioimaging, biosensors for proteins, detection of insulin, and recognition of fingerprints. Number of organic chromophores exhibited the behavior of AIE(E) properties, but only few of metal-free luminogens showed AIPE (aggregation-induced phosphorescence enhancement) active as a result of aggregation. Different from conventional fluorescent compounds, which are singlet-state emitters, heavy-metal phosphorescent complexes are triplet emitters. The strong metal-induced spin-orbit coupling leads to efficient mixing of singlet-triplet states, which eliminates the spin-forbidden nature of the radiative relaxation of the triplet state, thus enabling the enhancement of phosphorescence emission at room temperature. If these metal complexes carry amphiphilic units such as long alkyl chains, they can undergo aggregation in aqueous solution to form micelles and vesicles leading to enormous enhancement in luminescence with potential applications. We realized this interesting aggregation-induced emission enhancement phenomenon for the first time in the Re(I) tricarbonyl complexes in the past decade soon after the discovery of AIE phenomenon. Herein, the novel behavior of rhenium(I) supramolecules comprising long alkyl chains to exhibit AIPE and AIEE properties, and their efficacy as sensors will be explored.

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