

D- π -A designed dye chromophores and nanoparticles: optical properties, chemosensor effects and PE/Aramid fiber colorations

Young-A Son*, Su-Ho Kim and Young-Sung Kim

BK21 FTIT, Department of Advanced Organic Materials and Textile System Engineering,
Chungnam National University, S. Korea University
E-mail: yason@cnu.ac.kr

Studies on attractive color changing property of dye chromophore and fluorophore have been greatly enjoyed in the related industrial and research fields such as optoelectronics, chemosensor, biosensor and so on. The optical property based on D- π -A intramolecular charge transfer (ICT) system of chromophore molecules can be utilized as suitable sensing probes for checking media polarity and determining colorimetric chemosensing effect, especially heavy metal detection. These finding are obtained by absorption and emission properties.

In this work, donor-acceptor D- π -A type fluorescent dyes were designed and synthesized with the corresponding donor and acceptor groups.

The selected donor moieties might be provided prominent amorphous properties which are very useful in designing and synthesizing functional polymers and in fabricating devices. Another reasons to choose are commercial availabilities in high purity and low price. Donor-bridge-acceptor (D-A) type dyes can produce impressive optical-physical properties, yielding them potentially suitable for applications in the synthesis of small functional organic molecules. Small organic functional molecules have unique advantages, such as better solubility, amorphous character, and represent an area of research which needs to be explored and developed. Currently, their applications in metalorganic compounds is rapidly expanding and becoming widespread in self-assembly processes, photoluminescence applications, chiral organocatalysts, and ingrafts with nanomaterials.

Colloidal nanoparticles have received great attentions in recent years. The photophysical properties of nanoparticles, particularly in terms of brightness, photostability, emission color purity and broad adsorption range, are very attractive functions in many applications. To our knowledge background, colloidal nanoparticles have been enjoyed their applications in bio-probe research fields. This research interest can be raised by the advantages of the materials such as high photoluminescence quantum yields, sharp emission band, long-term photostability and broad excitation spectra. In recent, the uses of nanoparticles being embedded in a polymer matrix and binded on polymer surface have been explored and their properties such as photo-activation and

strong photoluminescence have been proposed.

The prepared chromophores and nanoparticles were investigated with absorption and emission properties, solvatochromic behaviors, pH induced color switching effects, chemosensing effects and HOMO/LUMO energy potentials with computer simulation. In addition, synthesized fluorophore dyes and particles were applied onto PE/Aramid fiber fluorescing colorations. And the related details were then discussed.

REFERENCES

- [1] P. Bamfield, *Chromic Phenomena: Technological application of colour chemistry*. The Royal Society of Chemistry, Cambridge, UK, 2001.
- [2] M. C. Janzen, J. B. Ponder, D. P. Bailey, C. K. Ingison, K. S. Suslick, *Anal. Chem.* 78 3591-3600 (2006).
- [3]. L. Qu and X. Peng, *J. Am. Chem. Soc.*, 124, 2049 (2002).
- [4]. W. R. Algar and U. J. Krull, *Anal. Chim. Acta*, 81, 193 (2007).