

## DEVELOPMENT OF NEW PHOTOINITIATING SYSTEMS FOR THE COMPOSITES SYNTHESIS

Mahmoud Rahal<sup>a,b,c</sup>, Joumana Toufaily<sup>c</sup>, Tayssir Hamieh<sup>c</sup> and Jacques Lalevée<sup>a,b</sup>

<sup>a</sup> Université de Haute-Alsace, CNRS, IS2M UMR 7361, F-68100 Mulhouse, France

<sup>b</sup> Université de Strasbourg, Strasbourg, France

<sup>c</sup> Laboratory of Materials, Catalysis, Environment and Analytical Methods (MCEMA) and LEADDER Laboratory, Faculty of Sciences, Doctoral School of Sciences and Technology (EDST), Lebanese University, Beirut 6573-14, Lebanon

In this work, six new fluorescent dyes derived from the Naphthalimide scaffold were synthesized and used in two and three-component photoinitiating systems (using iodonium salt (Iod) and NPG) for the Free Radical Photopolymerization of (meth)acrylate monomers under visible light using a light-emitting diode at 405 nm. Markedly, these dyes were never synthesized before. In fact, these PISs showed high initiation efficiency with both high final reactive function conversions and high polymerization rates. Interest of our study is to determine the effect of the different substituents on the naphthalimide core concerning the efficiency of initiation of the FRP. In order to improve the mechanical properties of the obtained polymers, these derivatives were also tested for the polymerization of a blend of acrylate/epoxy monomers (TA/EPOX); these latter properties were characterized by traction tests. The chemical mechanisms were investigated. In our study, naphthalimides were used for the synthesis of photocomposites using a UV@395 nm ( $4\text{W}/\text{cm}^2$ ) conveyor, but also for 3D printing experiments. Markedly, one of these compounds can be used as a new high-performance water soluble photoinitiator for photopolymerization in water and hydrogel synthesis [1].

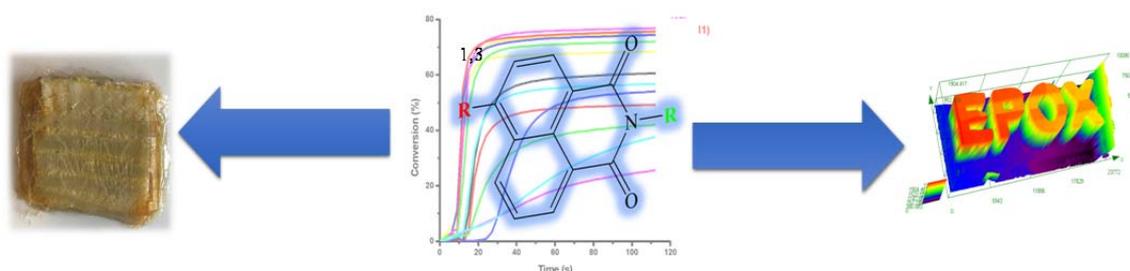


Figure. Naphthalimide as Photoinitiator for the FRP, photocomposites synthesis and 3D printing.

- [1] Rahal, M; Mokbel, H; Graff, B; Pertici, V; Gimes, D; Toufaily, J; Hamieh, T; Dumur, F; Lalevee, J. New Naphthalimides as Photoinitiators under Visible Light Irradiation and their Application: Photocomposite synthesis, 3D printing and Polymerization in Water. *ChemPhotoChem* **2021**, 5, 1-16.