

SOME FEATURES OF ELECTRIC AND PHOTOELECTROPHYSICAL PROPERTIES OF NEW PHOTSENSITIVE FILM COMPOSITES BASED ON NAPHTHALIMIDE-CONTAINING METHACRYLIC COPOLYMERS SENSITIZED BY ORGANIC DYES OF DIFFERENT TYPES



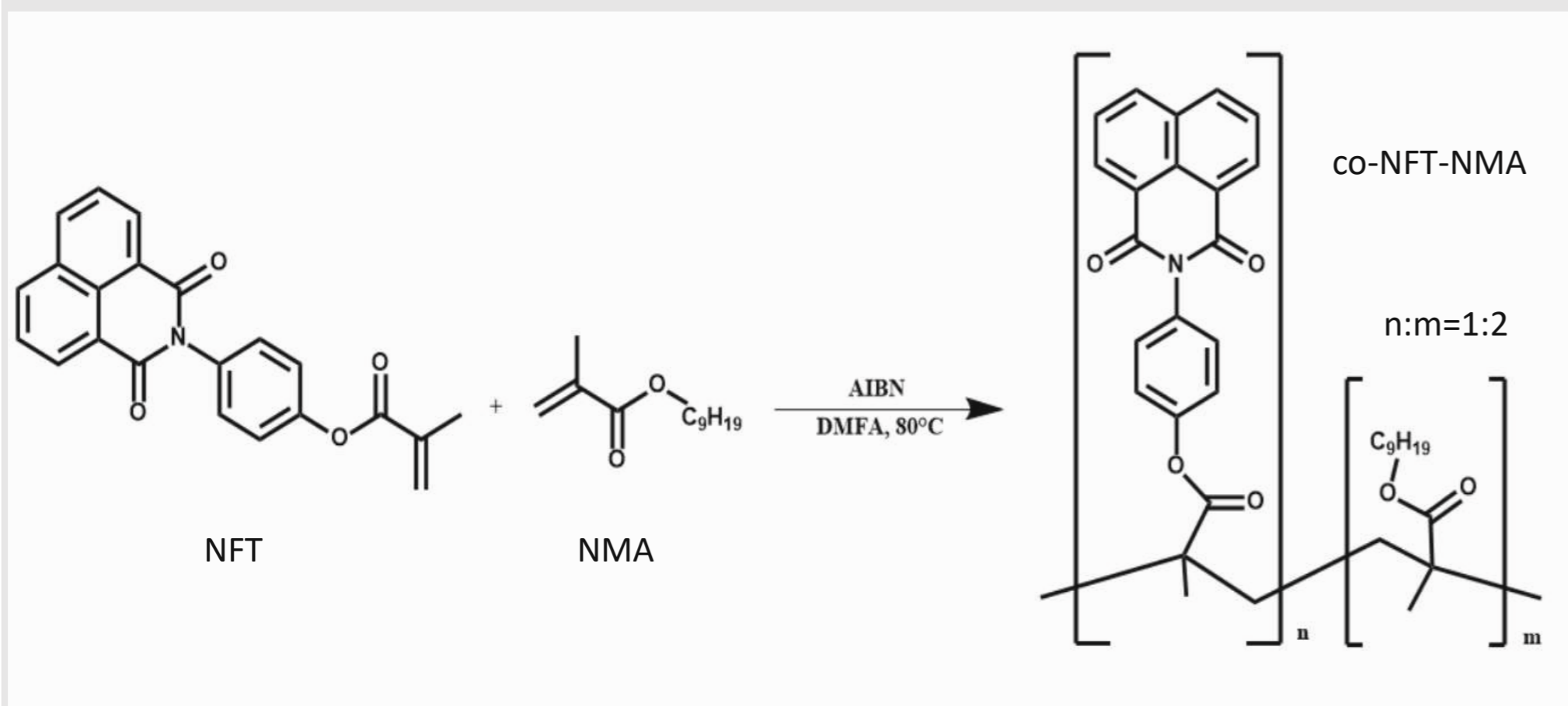
Solodukha H.A.^a, Studzinsky S.L.^a, Savchenko I.O.^a, Davidenko I.I.^a, Mokrinskaya O.V.^a, Pavlov V.A.^a,
Chuprina N.G.^a, Kravchenko V.V.^b

^aDepartment of Chemistry, Taras Shevchenko National University of Kyiv, 60 Volodymyrska Street, Kyiv, Ukraine. E-mail: hanna.solodukha@gmail.com

^bL.M. Litvinenko Institute of Physical-Organic Chemistry and Coal Chemistry, NAS of Ukraine, Kharkivs'ke shose St., 50, Kyiv, Ukraine

The new naphthalimide-containing methacrylic copolymer were synthesized by free-radical polymerization method. The novel photosensitive film composites ($L \sim 1 \mu\text{m}$) based on naphthalimide-containing methacrylic copolymer doped by an anionic polymethine dye have been prepared. Their electric, spectral and photoelectriophysical properties are investigated. The photoelectric properties of obtained composite films samples with a free composite surface (glass substrate – transparent electroconducting ITO ($\text{SnO}_2:\text{In}_2\text{O}_3$) sublayer – composite film) have been investigated by Kelvin probe method of surface electric potential measurement. It was shown, that investigated film composite exhibit photoconductive and photovoltaic properties under illumination by light from the anionic polymethine dye absorption region. It was shown that this composite film material exhibits the electronic type (n-type) of conductivity.

SYNTHESIS SCHEME



STRUCTURAL AND OPTICAL PROPERTIES

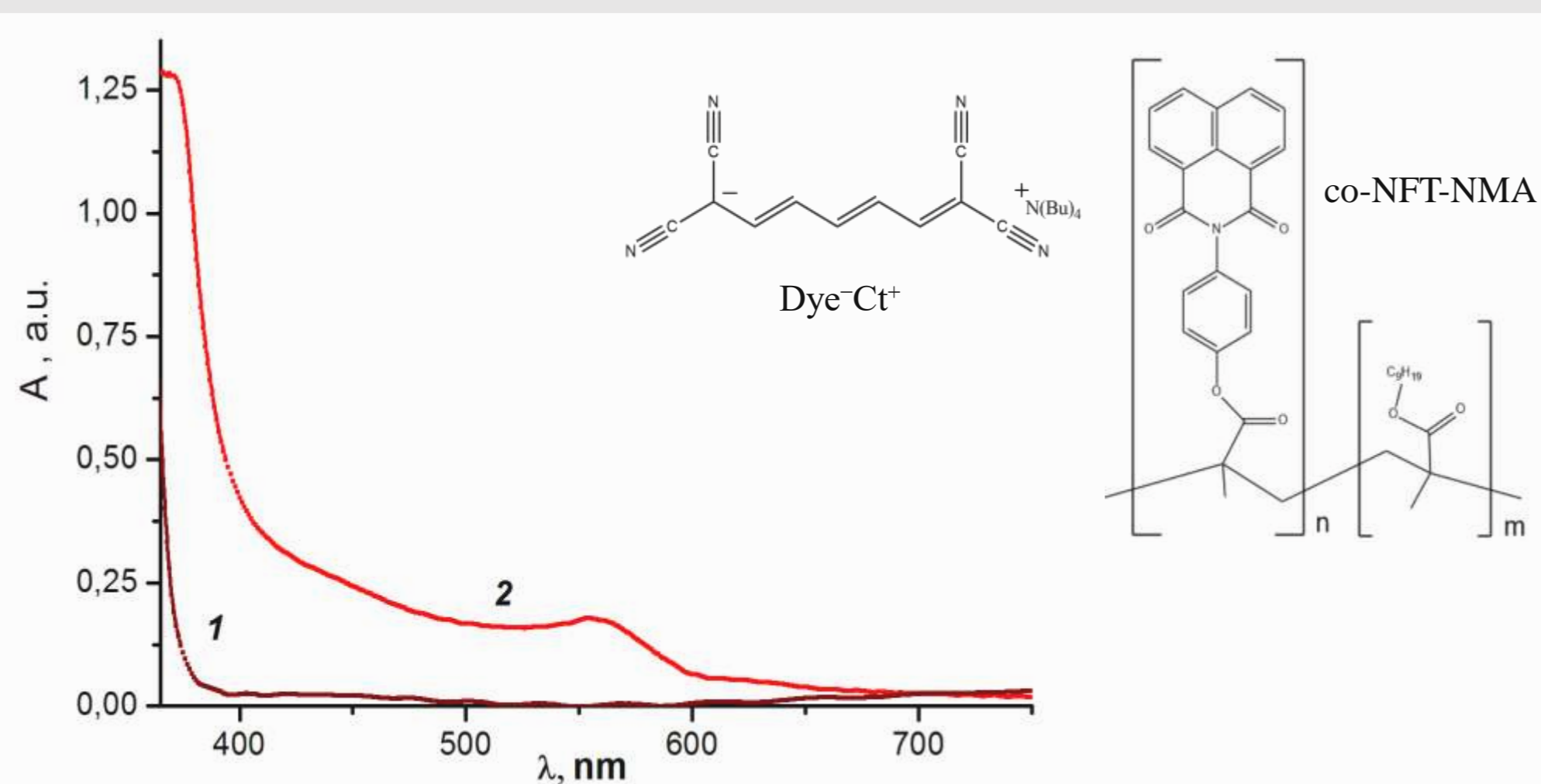


Fig. 1. Absorption spectrum of thin composite film based on: 1- co-NFT-NMA; 2- co-NFT-NMA doped with 1 wt. % polymethine dye (Dye^-Ct^+)

PHOTOELECTROPHYSICAL PROPERTIES

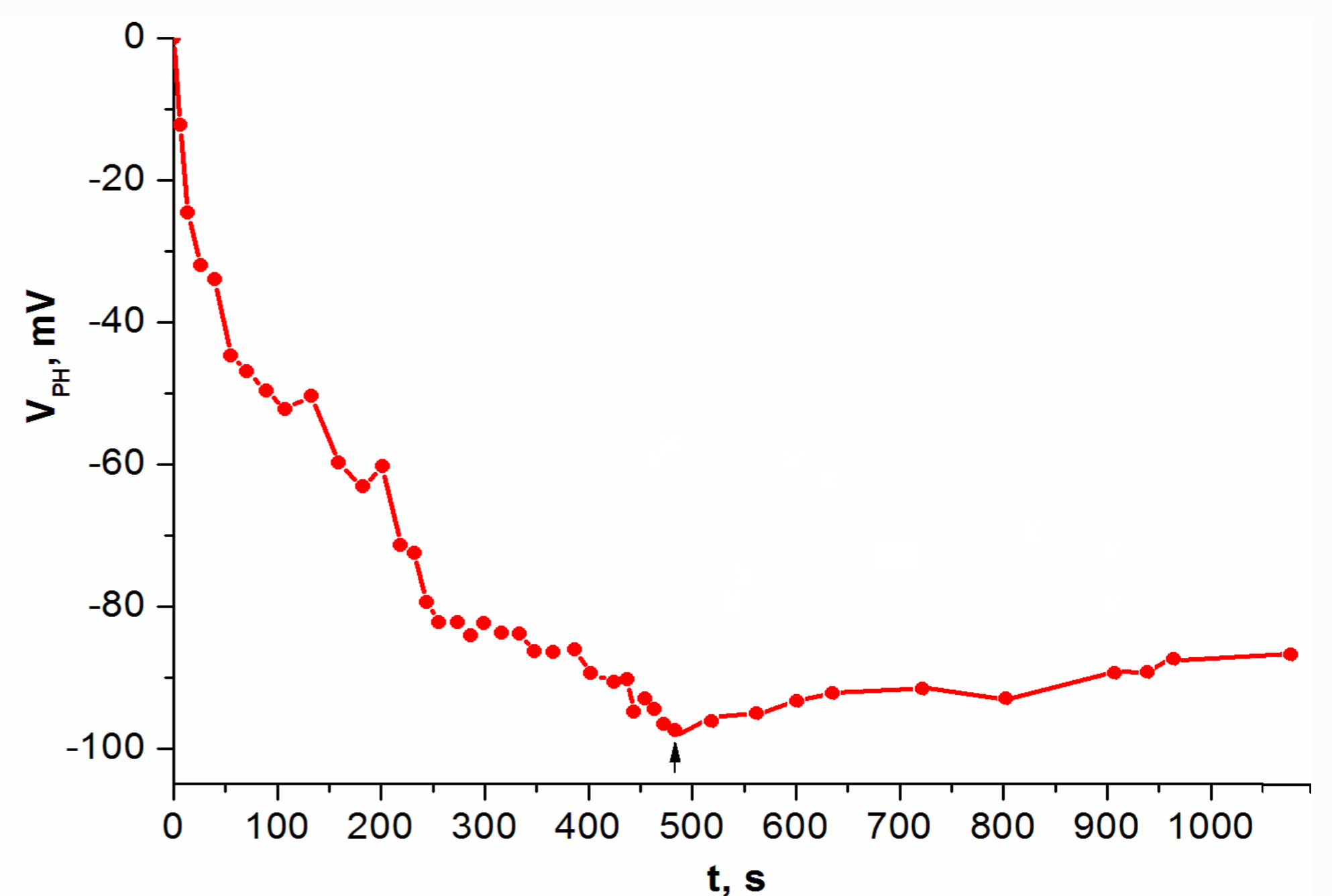


Fig. 3. Surface photovoltage (VPH) growth and relaxation kinetics in the sample with a free surface of polymer composite film based on co-NFT-NMA doped with 1 mass% polymethine dye under illumination of the ITO-electrode side of investigated sample by white light-emitting diode irradiation ($I = 40 \text{ W/m}^2$; the time moment of switching off the light illumination is shown by vertical arrow; Ag-based probe material).

PHOTOGENERATION SCHEMES OF NON-EQUILIBRIUM CHARGE CARRIERS IN THE co-NFT-NMA DOPED WITH ANIONIC POLYMETHINE DYE

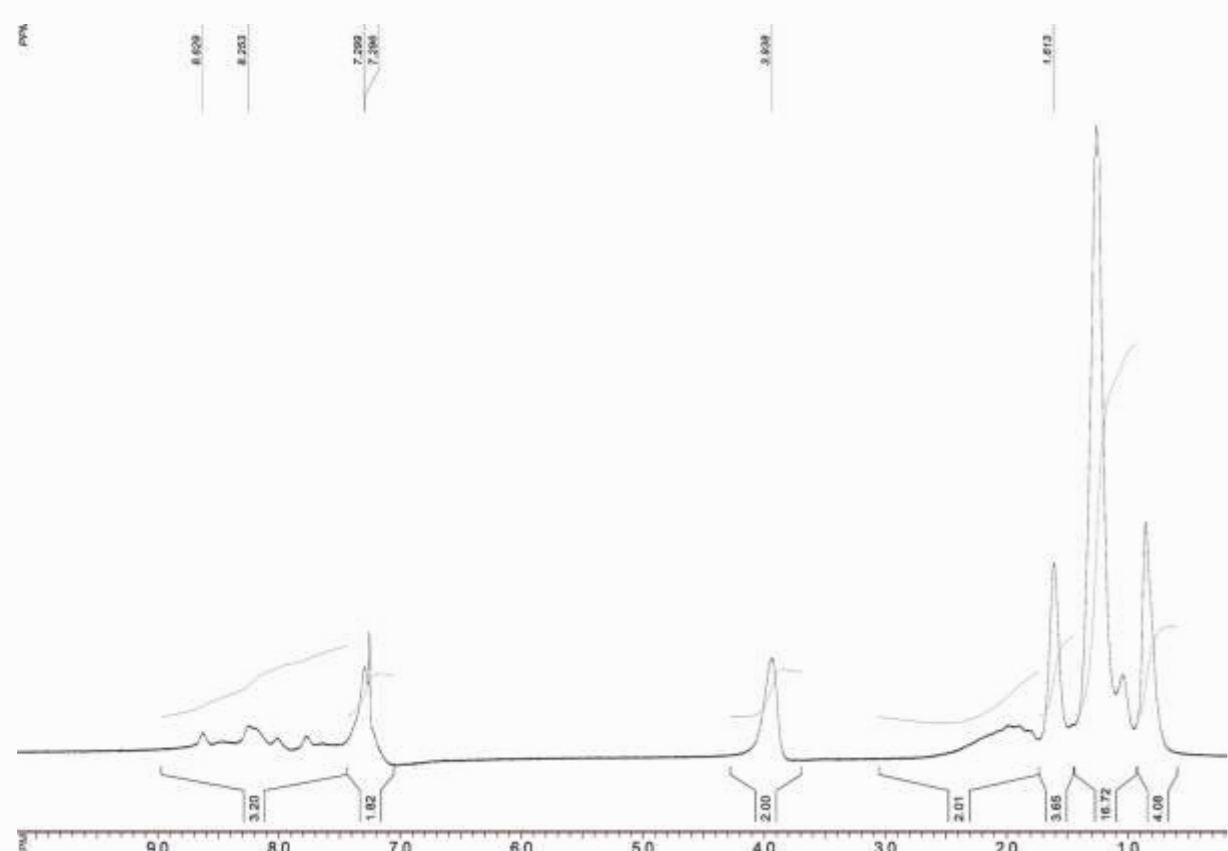
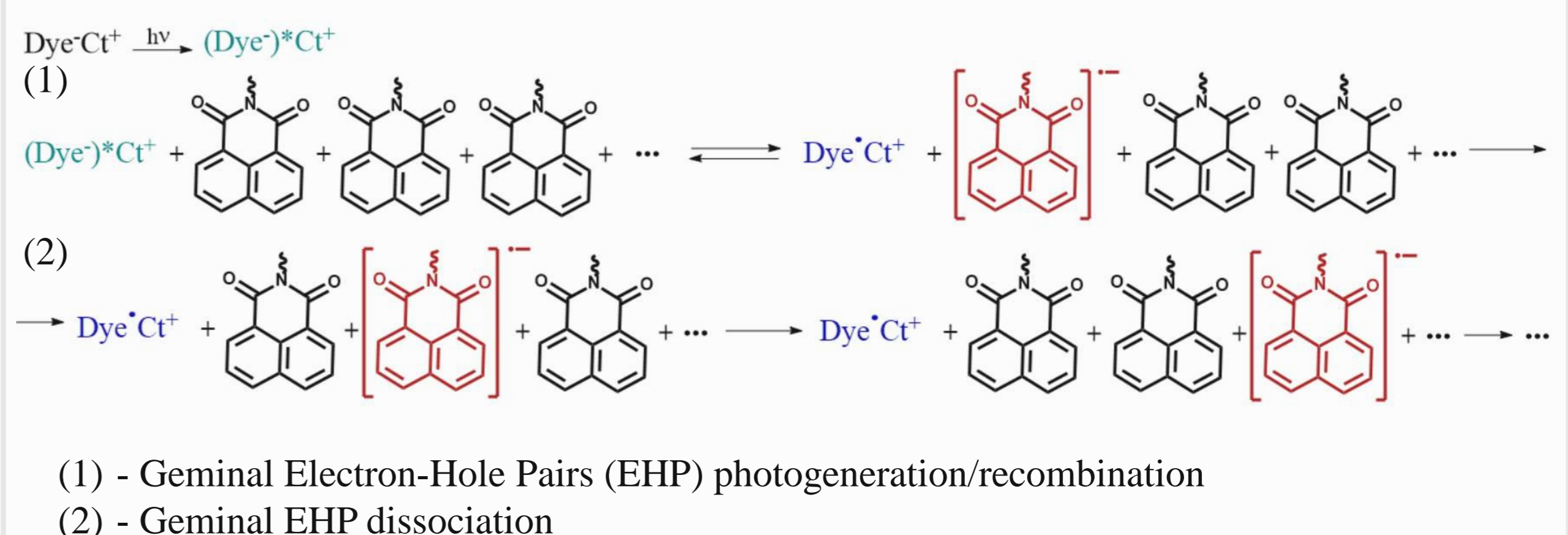


Fig. 2. ¹H NMR spectra of co-NFT-NMA