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Synthesis and holographic properties of alkyl 2-cyanoacetate acceptor fragment containing push – pull type organic glasses.

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Abstract: We present synthesis, optical and holographic properties of original structure organic glasses based on compounds consisting of three fragments: of N,N-bis(2-(trityloxy)ethyl)-4-vinylaniline or N,N-bis(5,5,5-triphenylpentyl)-4-vinylaniline fragments as electron donating fragment (D), 4*H*-pyran-4-ylidene fragment as linker(π) and of 2-(trityloxy)ethyl 2-cyanoacetate or 5,5,5-triphenylpentyl 2-cyanoacetate as acceptor (A) fragment. These push-pull (D- π-A) type molecular compounds show good solubility in non-polar solvents ($CHCl_3$ or CH_2Cl_2) and neat thin films with sufficient optical qualities have been obtained by spin-coating technique. Maxima of UV–VIS absorption in dichloromethane solutions and thin solid films lie between 460 nm and 550 nm and the maximum of luminescence spectra is observed between 580 nm and 670 nm. Both absorption and luminescence maximum depends on electron acceptor and electron donor fragment structure in D- π-A. Holographic recording of surface relief gratings (SRG) in films of these organic glasses have been carried out at 514.5 and 633 nm. For example, synthesized compound 5,5,5-triphenylpentyl 2-(2-((E)-4-(bis(5,5,5-triphenylpentyl)amino)styryl)-6-((E)-4-((6,6,6-triphenylhexyl)(5,5,5-triphenylpentyl)amino)styryl)-4H-pyran-4-ylidene)-2-cyanoacetate characterized by the glass transition temperature 97°C, UV-VIS (CH_2Cl_2): λ_{max}=495 nm (lgε = 4,76), λ_{em}= 633 nm, the recording diffraction efficiency of 1.6% and the specific recording energy of 0.16 J/(cm2 %).

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