**Supporting Information**

**1. Experimental spectra of magnetosensitive radiation-generated recombination luminescence for the 11 alkanes**

**Figure SI1:** Spectra of X-ray generated luminescence for a mixture of 6∙10‑3 M 1-(phenylethynyl)-4-(trifluoromethyl)benzene and 1∙10‑2 M DMA in two cyclic alkanes in applied magnetic field 20 mT (●) and in zero field (○): **А** – cyclohexane, χE = 17.3 ± 0.5%; **B** ‑ methylcyclohexane, χE = 16.2 ± 0.6%. Magnetic field effect was determined in the marked wavelength range.



**Figure SI2:** Spectra of X-ray generated luminescence for a mixture of 6∙10‑3 M 1-(phenylethynyl)-4-(trifluoromethyl)benzene and 1∙10‑2 M DMA in three branched alkanes in applied magnetic field 20 mT (●) and in zero field (○): **А** – 2,3-dimethylbutane, χE = 20.3 ± 0.5%; **B** – squalane, χE = 18.1 ± 0.6%; **C** – isooctane, χE = 19.1 ± 0.5%. Magnetic field effect was determined in the marked wavelength range.

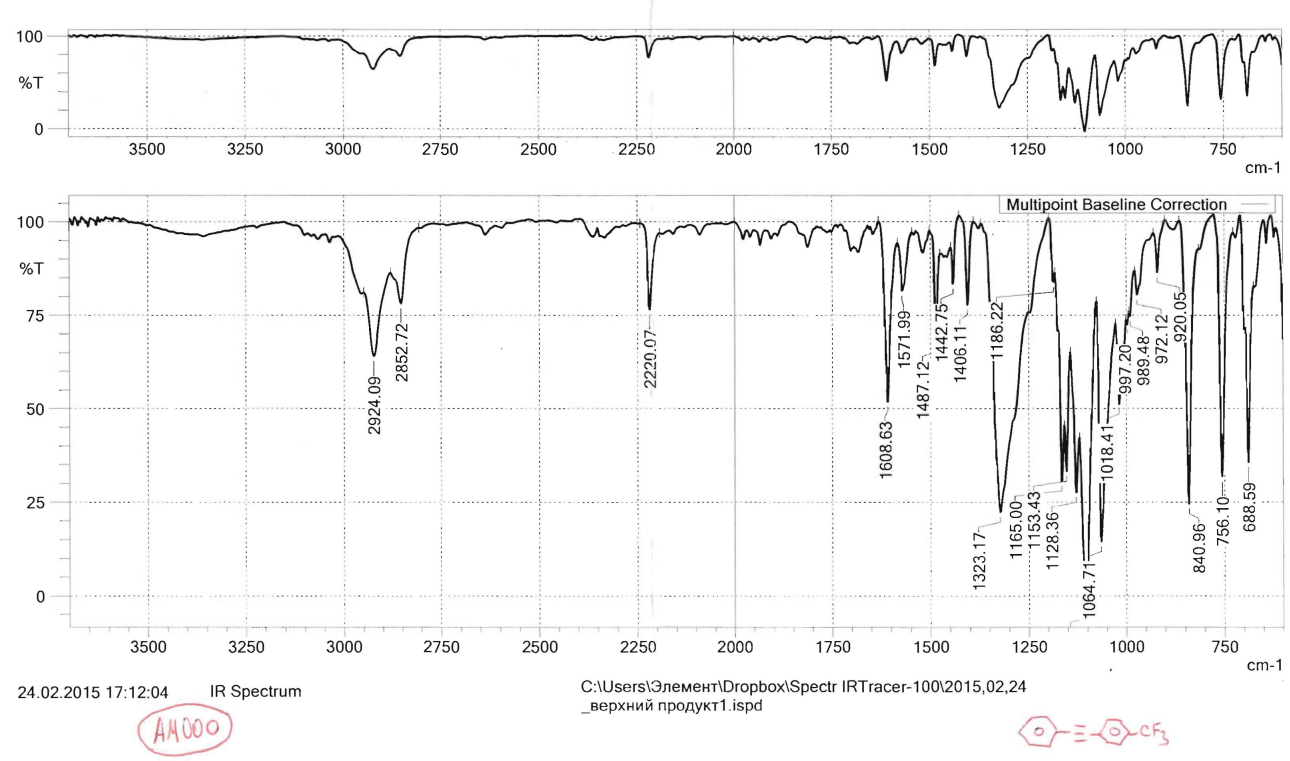
 

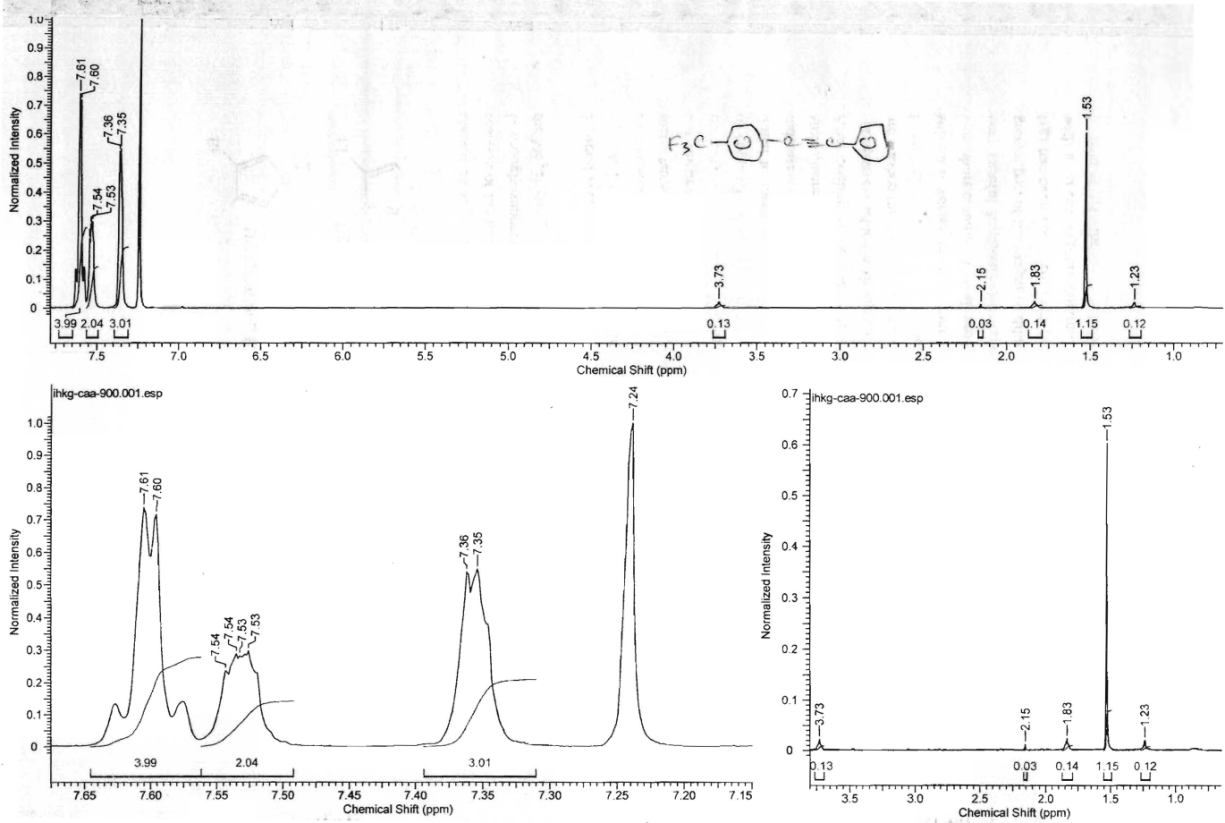
 

**Figure SI3:** Spectra of X-ray generated luminescence for a mixture of 6∙10‑3 M 1-(phenylethynyl)-4-(trifluoromethyl)benzene and 1∙10‑2 M DMA in six linear alkanes in applied magnetic field 20 mT (●) and in zero field (○): **А** – *n*-hexane, χE = 19.6 ± 0.7%; **B** – *n*-heptane, χE = 19.2 ± 0.2%; **C** – *n*-octane, χE = 19.4 ± 0.7%; **D** ‑ *n*‑decane, χE = 19.3 ± 0.4%; **E** – *n*-dodecane, χE = 19.8 ± 0.6%; **F** – *n*-hexadecane, χE = 19.6 ± 0.5%. Magnetic field effect was determined in the marked wavelength range.

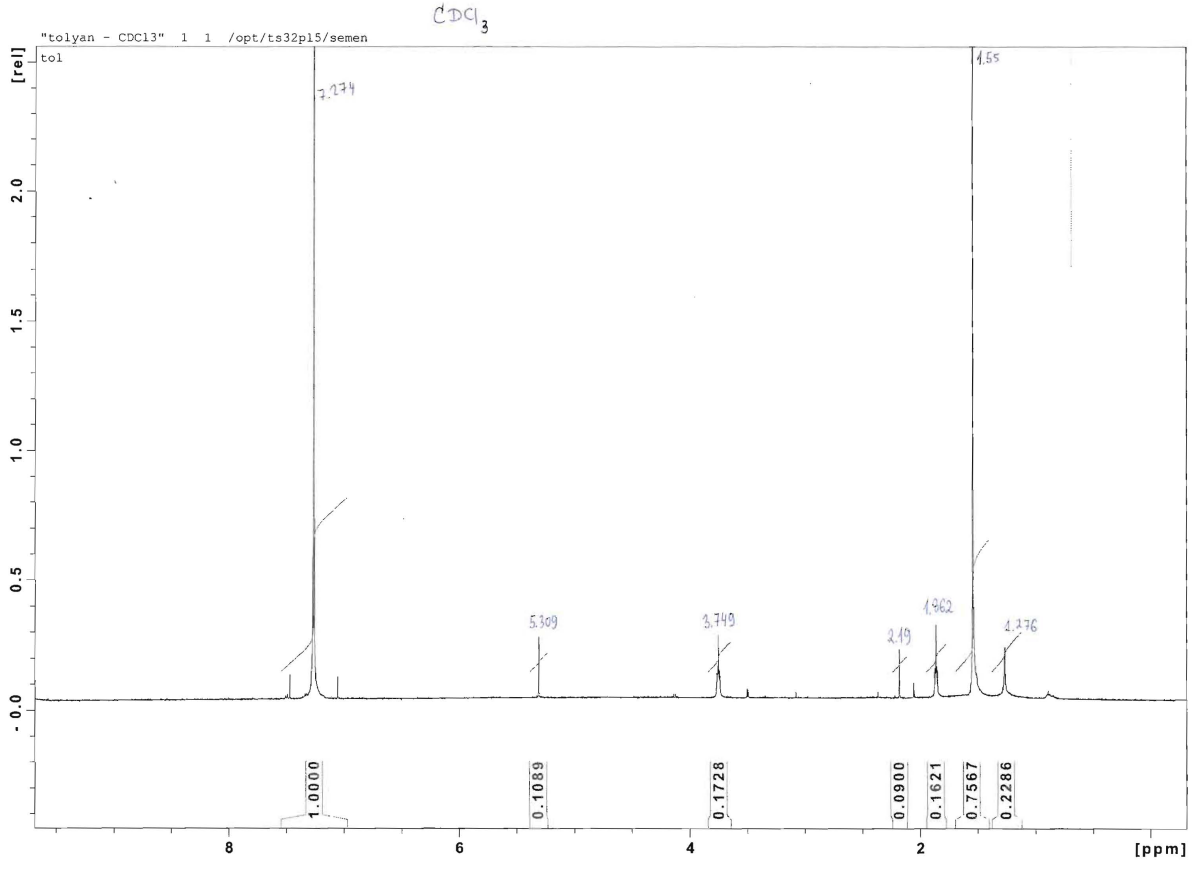
**2. Characterization of synthesized 1-(phenylethynyl)-4-(trifluoromethyl)benzene**



**Figure SI4:** FTIR spectrum for a crystal of 1-(phenylethynyl)-4-(trifluoromethyl)benzene.



**Figure SI5:** 1Н NMR spectra of 1-(phenylethynyl)-4-(trifluoromethyl)benzene solution in CDCl3. The peaks at 1.53 ppm, (H2O), 1.23 ppm, 1.83 ppm, 2.15 ppm, 3.73 ppm, 7.24 ppm (CHCl3) are due to minor impurities in the solvent (see the spectrum of “pure” CDCl3 in Figure SI6 below).



**Figure SI6:** 1Н NMR spectrum of CDCl3 used to take NMR spectrum of the synthesized compound.