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**Photo-induced electron transfer through silicon-bridge: The source for blue-green emission**Malgorzata Bayda<sup>1</sup>, Gonzalo Angulo<sup>2</sup>, Gordon L Hug<sup>3</sup>, Monika Ludwiczak<sup>1</sup>, Jerzy Karolczak<sup>1</sup>, Jacek Koput<sup>1</sup>, Jacek Dobkowski<sup>2</sup> and Bronislaw Marciniak<sup>1</sup><sup>1</sup>AMU/CAT, Poland<sup>2</sup>PAS, Poland<sup>3</sup>NDRL, USA

There are still few examples of materials emitting blue and green light. Coming forward to meet these needs, we proposed silicon-bridged chromophores as sources for blue-green emission. Although the individual chromophores chosen [N-isopropylcarbazole (CBL) and 1,4-divinylbenzene (DVB)] emit in the UV range, linking them through the silylene bridge switches on the colored emission which originates from an intramolecular charge transfer reaction (ICT). This phenomenon was observed not only for the polymer but also for its bichromophoric model compound representing the repeating unit of the polymer. This finding indicates that the ICT occurs between adjacent chromophores through the silylene bridge. If so, it was justified to use a model to describe in detail excited-state processes in this kind of substances to give rise to rational molecular design of new light-emitting materials. The questions raised in this work are: what are the nuclear motions essential to intramolecular charge transfer? Is the ICT process solvent-controlled or is the driving force some geometric change of a solute in the excited state? To answer these questions, we studied ICT on a model compound. We found that in nonpolar solvents, emission arises from the local excited state (LE) of carbazole whereas in more polar solvents dual emission was detected (LE+ICT). The CT character of the additional emission band was concluded from the linear dependence of the fluorescence maxima on solvent polarity. Electron transfer from CBL to DVB resulted in a large excited-state dipole moment (37.3 D) as determined from a solvatochromic plot and DFT calculations. Steady-state and picosecond time-resolved fluorescence experiments performed in butyronitrile (293-173 K) showed that the ICT excited state arises from the LE state of carbazole. These results were analyzed and found to consistent with an adiabatic version of Marcus theory including solvent relaxation.



**Figure 1:** Dual emission (LE+ICT) from the silicon-bridged compound containing *N*-isopropylcarbazole and divinylbenzene

**Biography**

Malgorzata Bayda received her PhD in Chemistry from Adam Mickiewicz University, Poznan, Poland. She has four external positions: short-term research positions at Radiation Laboratory, University of Notre Dame, USA working with Dr. Gordon L Hug (2008, 2015) and Postdoctoral Associate positions at Professor Jack Salliel's research laboratory at Florida State University, USA (2010-2011, 2012). Since 2009, she works as an Assistant Professor at AMU. She has her expertise in Photo-physics and Photochemistry of organosilicon compounds using steady-state and time-resolved absorption and emission spectroscopy. Her earlier work was focused on a *cis/trans* photo-isomerization of *p*-phenylene-silylene-vinylene polymers. Recently, her scientific interest turned toward searching for an attractive organosilicon light-emitting materials. To improve performance of such materials through rational molecular design, she investigates excited-state processes between silylene-bridged chromophores focusing on a role of silicon atom in these processes.

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