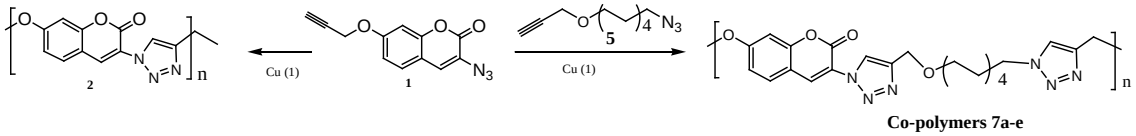
ENHANCEMENT OF PHOTOPHYSICAL PROPERTIES OF RIGID COUMARIN POLYMER VIA CO-POLYMERIZATION

JMV Ngororabanga[a*], Okerio Jaspher[a], Neliswa Mama[a]

[a] Department of Chemistry, Nelson Mandela Metropolitan University, P.O Box 77000, Port Elizabeth, 6031, South Africa.
E-mail: s212438700@live.nmmu.ac.za

ABSTRACT

Coumarin polymers, with extended conjugation, have received considerable attention as fluorescence probes and nonlinear optical materials.[1] However, the down fall of these polymers is poor solubility due to π-π stacking and aromatic backbone rigidity which affects their photophysical properties. One of the strategies that have been utilized to improve the properties of such polymers is the incorporation of desirable groups, through co-monomers that can disrupt the conjugation of aromatic rigid polymers.[2] In this work, we describe the modification of photopysical properties of rigid coumarin polymer **2** prepared via the Cu(I) catalyzed A-B step-growth click reaction through the inclusion of different amounts of solubilizing aliphatic co-monomer. Five co-polymers **7a**, **7b**, **7c**, **7d** and **7e** with 25%, 33%, 50%, 66% and 75% of feeding increase of aliphatic co-monomer and their photo- physical properties were analyzed.



Scheme **1**: Synthesis of polymer **2** and copolymer **7**a-e

Depending on the amount of aliphatic co-monomer, the emission properties of the rigid polymer **2** were modified (figure 2). Increasing the amount of aliphatic co-monomer from co-polymer **7e** to **7c** increased solubility which translated to increased chromophores in solution and hence the observed increase in the fluorescent intensities from **7e** to **7c**. However, co-polymers **7a** and **b** with the highest solubility, shows reduced emission intensity due to the lowest coumarin content in its chains and by extension in solution. The same results were observed with the absorption spectra.

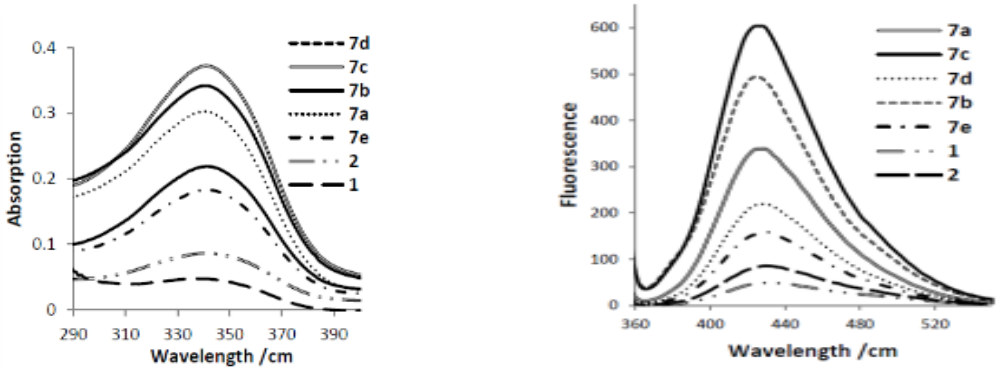


Figure **2**: Absorption (**a**) and emission (**b**) spectra of the polymer 7 and co-polymers in DMF at 25 °C . Conc. was 1×10^{-4} M

References:

1. Yee, D. J., Balsanek, V., Sames, D. *J. Am. Chem. Soc.* **2004**, 126, 2282-3.
2. S. Binauld, D. Damiron, T. Hamaide, J. P. Pascault, E. Fleury and E. Drockenmuller, *Chem. Commun*., **2008**, 4138.