

Comment

Comments on Lynch. Pyrrolyl Squaraines—Fifty Golden Years. *Metals* 2015, 5, 1349–1370

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In addition to the papers referenced in the main article [1]; a symmetrical pyrrol-2-yl and a range of symmetrical pyrrol-3-yl squaraines were given as examples of photosensitive pigment materials in a 1979 US patent from Eastman Kodak [2] in relation to electrophoretic migration imaging processes, symmetrical pyrrol-2-yl squaraines were covered for optical data storage applications in a 2005 US patent from BASF [3], symmetrical pyrrol-3-yl squaraines and unsymmetrical pyrrol-2-yl squaraines were both noted in a 2007 US patent from KyoWa Hakko Chemical covering their use as optical filters for electronic display devices [4], a range of pyrrol-2-yl squaraines were also included as examples in a computational study in 2007 on the diradical nature of both squaraine and croconaine dyes [5], and a pyrrol-2yl squaraine was shown in a 2009 review (in Spanish) of oxocarbons and pseudooxocarbons [6], of which squaric acid and squaraines are respective members.

Since publication of the main article, the following papers have also been published in 2015; a range of pyrrol-3-yl squaraines have been studied for their two-photon absorption properties [7], pyrrol-2-yl squaraines (both symmetrical and unsymmetrical) have been discussed in a review of squaraine dyes for use in organic photovoltaic cells [8], an unsymmetrical pyrrol-2yl squaraine has been studied in a continuous flow device for the photo-oxidation of phenol [9], and another unsymmetrical pyrrol-2-yl squaraine has been studied in solar cells [10].

Conflicts of Interest

The author declares no conflicts of interest.

References

1. Lynch, D.E. Pyrrolyl Squaraines—Fifty Golden Years. *Metals* **2015**, *5*, 1349–1370.

2. Haley, N.F.; Krutak, J.J.; Ott, R.J. Electrophotosensitive materials for migration imaging processes. U.S. Patent 4,175,956, 10 February 1978.
3. Berneth, H.; Bruder, F.K.; Haese, W.; Hassenruck, K.; Kostromine, S.; Landenburger, P.; Sommermann, T.; Stawitz, J.W.; Hagen, R.; Oser, R.; *et al.* Squarylium dyes as light-absorbing compound in the information layer of optical data carriers. U.S. Patent 10,508,417, 18 March 2003.
4. Shimizu, I.; Kinugasa, M.; Toyoda, H.; Ikuta, M.; Katagi, K. Filters of Electronic Displays. U.S. Patent 10,516,749, 3 July 2003.
5. Srinivas, K.; Prabhakar, C.; Devi, C.L.; Yesudas, K.; Bhanuprakash, K.; Rao, V.J. Enhanced diradical nature in oxyallyl derivatives leads to near infra red absorption: A comparative study of the squaraine and croconate dyes using computational techniques. *Phys. Chem. A* **2007**, *111*, 3378–3386.
6. De Oliveira, V.E.; Diniz, R.; de Oliveira, L.F.C. Oxocarbonos, Pseudo-oxocarbonos e esuarainas. *Quim. Nova* **2009**, *32*, 1917–1925.
7. Sun, C.L.; Liao, Q.; Li, T.; Li, J.; Jiang, J.Q.; Xu, Z.Z.; Wang, X.D.; Shen, R.; Bai, D.C.; Wang, Q.; *et al.* Rational design of small indolic squaraine dyes with large two-photon absorption cross section. *Chem. Sci.* **2015**, *6*, 761–769.
8. Chen, G.; Sasabe, H.; Igarashi, T.; Hong, Z.; Kido, J. Squaraine dyes for organic photovoltaic cells. *J. Mater. Chem. A* **2015**, *3*, 14517–14534.
9. Borah, P.; Sreejith, S.; Anees, P.; Menon, N.V.; Kang, Y.; Ajayaghosh, A.; Zhao, Y. Near-IR squaraine dye-loaded gated periodic mesoporous organosilica for photo-oxidation of phenol in a continuous-flow device. *Sci. Adv.* **2015**, doi:10.1126/sciadv.1500390.
10. Paek, S.; Rub, M.A.; Choi, H.; Kosa, S.A.; Alamry, K.A.; Cho, J.W.; Gao, P.; Ko, J.; Asiri, A.M.; Nazeeruddin, M.K. A dual-functional asymmetric squaraine-based low band gap hole transporting material for efficient perovskite solar cells. *Nanoscale* **2015**, doi:10.1039/C5NR05697G.