The first phthalocyanine with two axial fullerene substituents

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In the light of their multifunctionality and specific shape, phthalocyanines(Pcs) have long attracted enormous interest owing to their intriguing electrical, optical, photochemical and catalytic properties.[1)] Among the various electro- and photoactive chromophores utilized for phthalocyanine chemistry[2)], electroactive C_{60} has been proposed to be a versatile building block and a growing interest in fullerene-functionalized phthalocyanines is developing[3)]. However, no phthalcyanine with more than one fullerene substituents has been reported until now. Hence, we report the first synthesis of the soluble silicon phthalocyanine **1** with two axial fullerene substituents.

The structure of **1** was confirmed by ^{1}H and ^{13}C NMR spectroscopies and MALDI-TOF MS. Electrochemical properties of **1** were measured by cyclic voltammetry(CV) together with differential pulse voltammetry(DPV), and the results were collected and compared with the compounds **2** and **3** (Table 1)

The UV/VIS spectrum of **1** in $CHCl_3$ showed characteristic phthalocyanine absorption bands at 354(B band), 430(C_{60}), 563, 580, 607, 645, and 675 nm(Q bands). Comparison of Q band of **1** in solution as well as in spin-coated film showed that edge-to-edge interactions are small for **1** and **2** and these spin-coated films resemble true solid solutions of **1** and **2**.

Polarized optical microscopy suggests that the films derived from **1** and **2** are uniform and isotropic(nonbirefringent). Each of the Pcs **1** and **2** displays a distinct glass transition on cooling from the melt. Therefore, films can also be readily fabricated by melt processing. This study has yielded robust, nonscattering glasses. These easily processable solid solutions are suitable materials for optical studies, which are now under investigation.

Reference

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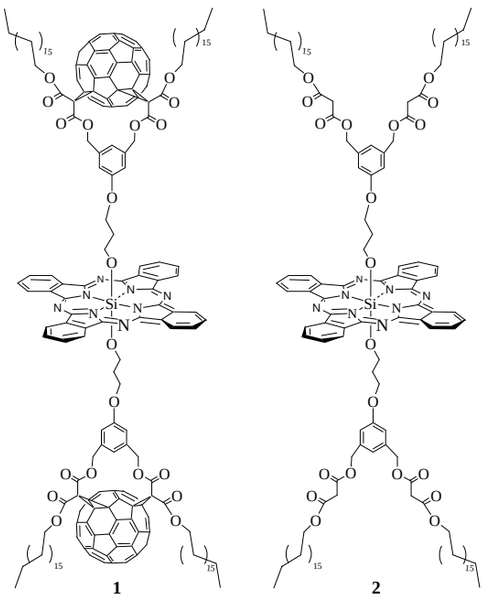

1 **2**

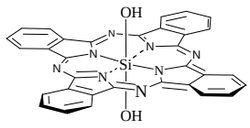

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Table 1. Electrochemical properties of **1**, **2** and **3**. Values for $(E_{PC}+E_{PA})/2$[V] (vs. Ag/Ag^{+})

Compound	**1**	**2**	**3**
Oxidation	1.033		
Reduction	-0.641	-0.773	-0.771
	-0.802	-1.991	-2.071
	-1.135		
	-1.385		
	-1.881		
	-2.164		
	-2.447		
	-2.573		

Cyclic voltammetry measurements : gold electrode, Ag/Ag^{+} pseudoreference electrode, Pt wire counter electrode, degassed THF, 0.1 M Bu_4NClO_4, scan rate 100 mV/s