



from the solution to the electrode; that means that it is uncharged.<sup>11</sup> This observation establishes that **1** is obtained as its molecular form, which is in agreement with the fact that no reduction wave of an oxidized macrocycle ( $nc^{2-}$ ) is detected in the domain. Bisphthalocyanines and bisnaphthalocyanines show one reduction wave and one oxidation wave; at  $-0.42$  and  $-0.02$  V for  $[Lu(pc)_2]$ ; at  $-0.26$  and  $0.07$  V for **2**;<sup>12,3</sup> in these complexes, one reduced and one oxidized form of the ligand are associated with the lanthanide cation. For com-

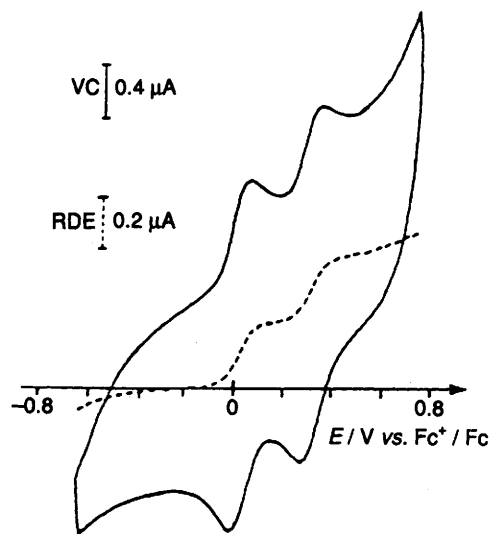


Fig. 3 Voltammetry of **1**, in  $CH_2Cl_2$ : cyclic voltammetry ( $\nu = 0.1$  V  $s^{-1}$ ) and RDE voltammetry ( $n = 500$  rpm,  $\nu = 5$  mV  $s^{-1}$ )

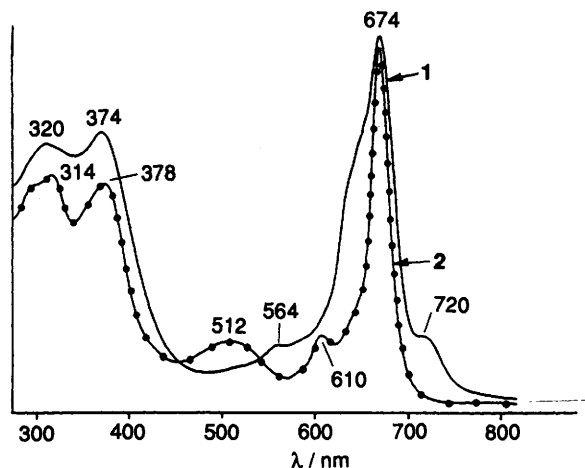


Fig. 4 UV-VIS spectrum of **1** and **2** in  $CH_2Cl_2$

pound **1**, no reduction process occurs as the three ligand moieties are in their reduced form. But, surprisingly, only two steps are observable. Extending the conjugation over a third macrocyclic ring stabilizes the HOMO, as it is much more difficult to oxidize the triple-decker sandwich than the reduced form of the bisnaphthalocyanine (where the two ligands are in their reduced state, as in **1**).

The UV-VIS spectrum of **1** (Fig. 4) is different from that of **2**. The Soret region (300–400 nm) is almost the same for the two compounds. The  $\lambda_{max}$  for the Q bands are identical; however, for **1**, the band is larger and complex, due to shoulders at about 620 and 720 nm. An important feature is the absence of the weak band at 500 nm, visible in the spectrum of **2**. Such a transition is usually present in bismacrocyclic complexes when one of the macrocycles is oxidized. This also confirms that the triple-decker associates two  $Lu^{3+}$  cations and three macrocycles in their anionic form ( $nc^{2-}$ ).

Efforts to obtain single crystals of the compound are in progress.

This work was supported by funds from the CNRS, the Université de Bretagne Occidentale and a grant from the Région de Bretagne (F. Guyon). Dr P. Guenot (Université de Rennes I) is thanked for his help in mass spectroscopy.

Received, 26th January 1994; Com. 4100506F

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