

Anodic Immobilization of Aromatic Molecules on a Pyridine-Functionalized Electrode *via* the Formation of Pyridinium Bonds

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Immobilization of functional molecules on an electrode surface is a crucial step towards the development of applications. Among these molecules, porphyrins exhibit interesting physicochemical properties. Thus, they have been exploited for many applications in various research fields such as electrocatalysis,¹ photoluminescent biosensors,² nonlinear and optical limiting devices.³ Several approaches have been developed to deposit the porphyrin moiety by post-functionalization of modified substrate. The coupling method can be performed via the formation of different chemical bonds: amide⁴, ester⁵, coordination⁶ bond or using Huisgen cycloaddition reaction (click chemistry)⁷.

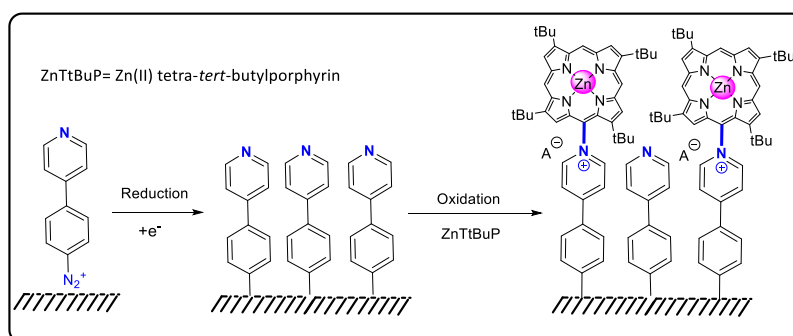


Figure 1. Immobilization of a porphyrin by oxidation through a modified pyridine-based working electrode.

In this work, for the first time, we have shown that it is possible to immobilize a porphyrin *via* its oxidation on a pyridine-functionalized working electrode surface. UV-vis. spectroscopy, cyclic voltammetry, XPS, SEM, AFM and TOF-sims analyses have been performed to confirm the chemical composition of the thin porphyrinic material.

REFERENCES

¹Aleksei, N. M.; Jiang, Y. *acs Sustainable Chem. Eng.* **2019**, 7, 4, 3838–3848

²Khairutdinov, R. F.; Serpone, N. *J. Phys. Chem. B.* **1999**, 103, 761–769.

³Wang, A. J.; Yu, Huang, W.; Zhang, M. G. L. et al. *Sci. Rep.* **2016**, 6, 23325.

⁴Rocklin, R.D.; Murray, R.W. *J. Electroanal. Chem.* **1979**, 100, 271–282.

⁵Baskaran, D.; Matthew S. B. *J. am. chem. soc.* **2005**, 127, 6916–6917.

⁶Zuo, G.; Yuan, H.; Yang, J.; Zuo, R.; Lu, X. *J. Mol. Catal. Chem.* **2007**, 269, 46–52.

⁷Mennel, J. A.; Barile, C. J. *J. Phys. Chem. C.* **2020**, 124, 19716–19724