

# ON THE ELECTROCHEMICAL BEHAVIOUR OF OLEAMIDES

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## 1. Introduction

This work is devoted to the electrochemical characterization of two oleamides (Fig. 1): 1 phenoxy-2-propanol-3-izopropyleamide (**1**) and N-(4-hydroxyphenethyl)oleamide (**2**). The compounds were synthesized from oleic acid and 1,1 - carbonyldiimidazole to give the oleyl-imidazol intermediate which reacted with the corresponding amines, according to the procedure described in [1]. The new oleamides were characterized by IR, <sup>1</sup>H- and <sup>13</sup>C-NMR spectra.

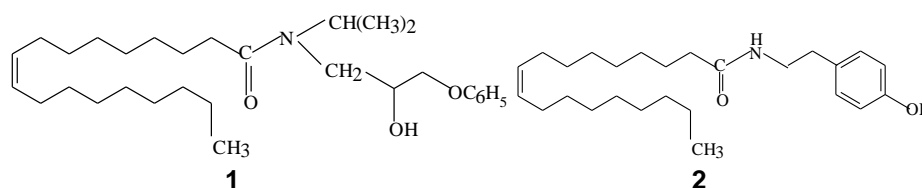


Fig. 1. Structure of investigated compounds

Electrochemical investigations were performed by cyclic voltammetry (CV), differential pulse voltammetry (DPV) and rotating disk electrode (RDE).

## 2. Experimental

All compounds used for synthesis were purchased from Merck and used without further purification. For electrochemical investigations acetonitrile and tetrabutylammonium perchlorate (TBAP) from Fluka were used (as received) as solvent and supporting electrolyte, respectively. The electrochemical experiments were carried out using a PGSTAT12 AUTOLAB potentiostat coupled to a three-compartment cell. The CV curves were generally recorded at 0.1V/s or at various rates (0.1 - 1V/s) when studying the influence of the scan rate. DPV curves were recorded at 0.01V/s with a pulse height of 0.025V and a step time of 0.2 s. The RDE curves were recorded at 0.01V/s. The working electrodes were glassy carbon disks (diameter of 3mm). The active surface was polished before each determination with diamond paste (200  $\mu$ m). Ag/10 mM AgNO<sub>3</sub> in 0.1 M TBAP, CH<sub>3</sub>CN was used as reference electrode. The potential was referred to the potential of the ferrocene/ferricinium redox couple (Fc/Fc<sup>+</sup>) which in our experimental conditions was +0.07V. A platinum wire was used as auxiliary electrode. The electrochemical experiments were performed at 25°C under argon atmosphere.

## 3. Results and Discussion

The electrochemical behavior of compound was studied in acetonitrile (CH<sub>3</sub>CN) containing tetrabutylammonium perchlorate (TBAP) as supporting electrolyte, using stationary or rotating glassy carbon electrodes. The results of electrochemical experiments carried out by CV, DPV and RDE are shown in Fig. 2. Anodic curves were recorded individually, starting from the stationary potential. No cathodic process can be evidenced. The anodic processes (1a - 5a) are denoted in the order in which they appear in the voltammograms. Two main anodic processes (1a and 2a) are observed in all kind of curves (Fig. 2). The influences of the scan rate and scan domain on the CV curves showed that all processes are irreversible.

By cycling the potential in the range of the first anodic peak a decrease of the current has been seen showing the formation of a film or accumulation of insoluble products on the electrode surface. The cycling led to a modified electrode which was characterized by CV. The transfer of this modified electrode in ferrocene solutions in supporting electrolyte showed altered CV curves for the redox probe. The ferrocene signal is smaller in intensity and very flat, confirming the electrode covering with a insulating layer (film or insoluble products). The electrode modification can be performed also by controlled potential electrolysis.

The results obtained for both oleamides are in agreement with the previous characteristics obtained for a similar compound [2]. However, the two investigated compounds show different electro activities evidenced by different domains of potential for anodic processes. Compound **2** is oxidized easier than **1**. This behavior could be explained by the

differences in their structures. The presence of an aromatic moiety connected to the amide in **2** is expected to give it better adsorption on the electrode and, consequently, **2** is oxidized easier.

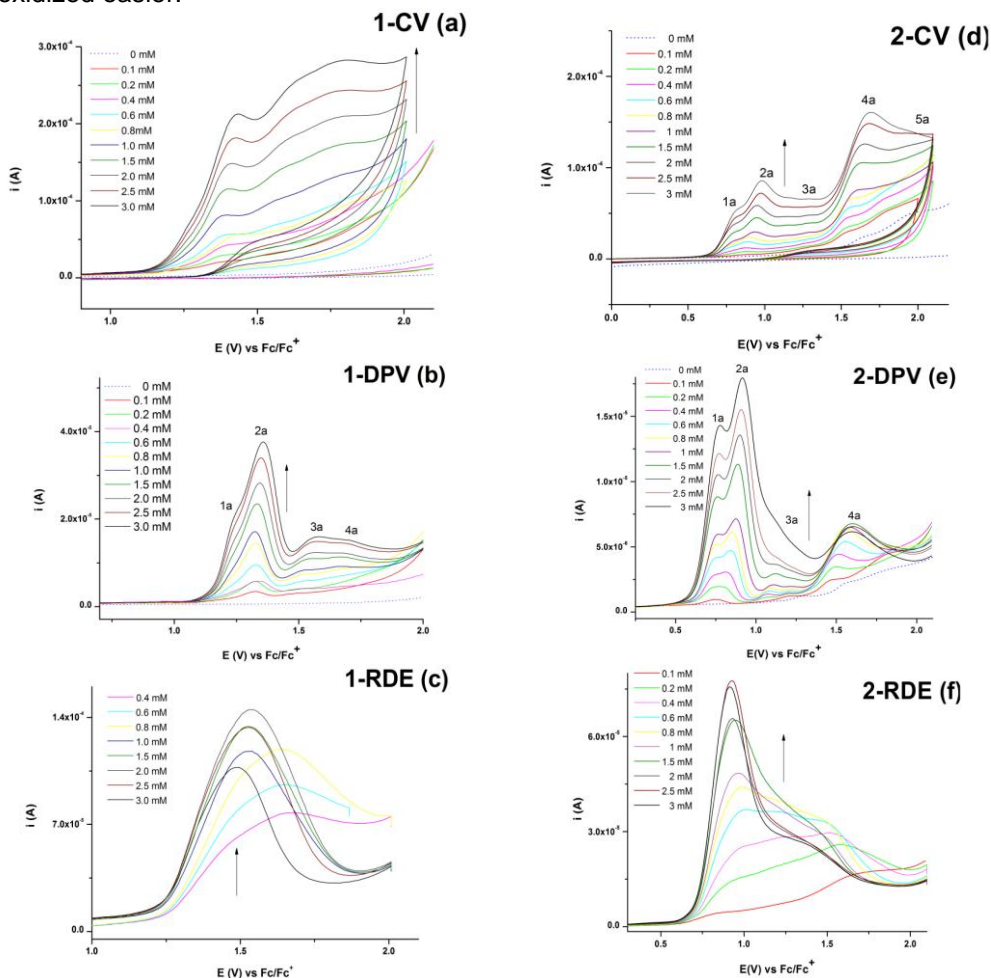


Fig. 2. CV (a,d), DPV (b,e) and RDE (c,f) curves for **1** (a,b,c) and **2** (d,e,f) obtained for different concentrations of each compound

#### 4. Conclusions

Two main anodic irreversible processes were identified by cyclic and differential pulse voltammetry. Scanning the potential in the range of the first anodic peak led to the coverage of the electrode with an insulating layer. Its formation was confirmed by rotating disk electrode curves.

#### Acknowledgments

The work has been funded by the Sectoral Operational Programme Human Resources Development 2007-2013 of the Ministry of European Funds through the Financial Agreement POSDRU/159/1.5/S/132395 and UEFISCDI project ID PN-II-PT-PCCA-2013-4-2151, contract nr. 236/2014.

#### References

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