# Functional Materials

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## Modification of 2-amino-3-hydroxypyridine onto the glassy carbon electrode: determinations of Que, Gal, 3HF, and Chr

A. Demir Mülazımoğlu[1], E. Yılmaz[1], İE. Mülazımoğlu[1]

[1]Necmettin Erbakan University, Chemistry, Konya, Turkey

admulazimoglu@konya.edu.tr
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Phenolic compounds are a complex group of substances that have attracted considerable attention due to their roles in providing flavor and color characteristics of food and in human health which are associated with their antioxidant activities [1, 2]. Many of the benefits associated with consumption of phenolic-rich foods are associated with their antioxidant activities [3]. The oxidation of flavonoids is of great interest because of their action as antioxidants with the ability to scavenge superfluous superoxide free radicals in the human body [4] by means of electron transfer processes. Among the wide variety of techniques [5, 6] used to detect antioxidants, electrochemical methods have the advantage of their high sensitivity, low cost, and inherent portability [7]. All flavonoids are electroactive, easily subject to either oxidation or reduction electron transfer reactions; hence, they can be investigated by electrochemical methods. The redox potentials of flavonoids determined by cyclic voltammetry are considered good measures of their antioxidant capacities.

Flavonoids, with high antioxidant activity in fruits and vegetables, are natural vegetable dyes synthesized from phenylalanine. They are very essential for human health due to their activity as free radical acceptors. In this study, the availability in the determination of quercetin (Que), galangin (Gal), 3-hydroxyflavone (3HF), and chrysin (Chr) of a modified glassy carbon (GC) sensor electrode using 2-amino-3-hydroxypyridine (AHP) was examined separately and simultaneously by cyclic voltammetry (CV). Surface characterization of modified electrodes was performed using CV, electrochemical impedance spectroscopy, and scanning electron microscopy techniques. The usability of the modified electrode was examined in the determination of some flavonoids by square wave voltammetry. From the experimental results, it was found out that Que, 3HF, and Chr; Gal, 3HF, and Chr; and 3HF and Chr can be determined simultaneously by using an AHP-modified GC sensor electrode. Also, these molecules can easily be determined separately by using the modified electrode.

The purposes of this study are (1) to obtain a new surface by modifying the glassy carbon (GC) electrode surface using AHP, (2) to characterize the obtained surface using electrochemical, spectroelectrochemical, and microscopic techniques, (3) to the check whether the molecule is bound to the GC electrode surface as diffusion-controlled and to support this graft through the SEM technique, (4) to investigate whether the new surface obtained is sensitive to the four different flavonoid derivatives both through cyclic voltammetry (CV) and square wave voltammetry (SWV), and (5) to investigate the usability of the developed electrode in the quantitative determination of used flavonoid derivatives simultaneously or separately.

1. Vermerris W, Nicholson R, Phenolic compound biochemistry, (2008) Springer, Berlin
2. Shahidi F, Ho CT, Phenolic compounds in foods and natural health products. (2005) The American Chemical Society, Urbana
3. Sawa T, Nakao M, Akaike T, Ono K, Maeda H, J Agric Food Chem 47 (1999) 397
4. Zhang J, Stanley RA, Adaim A, Melton LD, Skinner MA, Mol Nutr Food Res 50 (2006) 996
5. Chew LY, Khoo HE, Amin İ, Azrina A, Lau CY, Food Anal Methods 5 (2012) 126
6. Berker KI, Güçlü K, Tor İ, Demirata B, Apak R, Food Anal Methods 3 (2010) 154
7. Makhotkina O, Kilmartin PA, J Electroanal Chem 633 (2009) 165

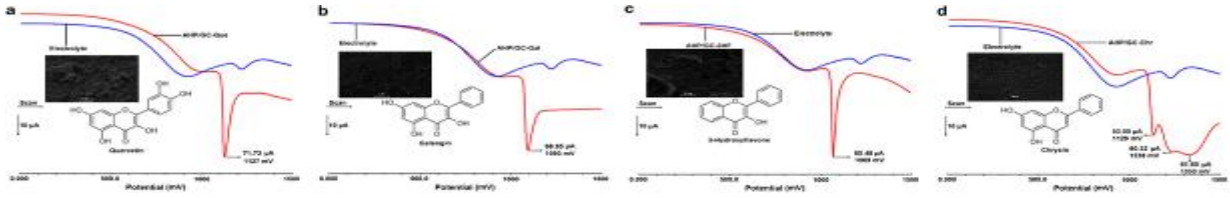


**Figure 1.** Square wave voltammograms and SEM images of flavonoids (1 mM) onto the AHP/GC electrode surfaces. **a)** Que, **b)** Gal, **c)** 3HF and **d)** Chr.