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Nafion-Induced Alterations in Protein Stability and Functionality

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Given the intricate nature of protein bioelectrochemistry, the immobilization technique adopted shows utmost importance to crucial factors such as biocatalytic activity and stability[1]. Entrapment methods are widely used due to the easy immobilization, including the possibility of simultaneous immobilization of multiple layers, besides reducing direct contact with the reaction medium, which contributes to minimizing leaching effects[1]. Despite the widespread use of the technique, with emphasis on the use of Nafion, an ionomer with sulfonated and perfluorinated groups, the literature still presents many gaps regarding how the characteristics of the polymer interfere with the protein activity, as pointed out by recent discussions[2]. Therefore, in order to understand the effect of pH on proteins due to their high sensitivity to medium conditions, electrochemical and in-situ spectroscopic studies were proposed to relate the effects on the secondary structure of alcohol dehydrogenase enzyme and how this affects its catalytic performance. With the advantage of extensive literature on the chosen protein, initial studies already show significant variations in electroactivity under different pH Nafion conditions, consistent with alterations in the proportions of beta-sheets and alpha-helix, as expected due to the high dependence between the enzyme's secondary structure and its bioelectrochemical activity[3].

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References

[1]PEREIRA, A. R., et al. Advances in enzyme bioelectrochemistry. An Acad Bras Cienc 90, 2018.

[2]ARTNER, C. et al. Effects of interactions between SPEEK or Nafion ionomers and bilirubin oxidase on O2 enzymatic reduction. Electrochim Acta 426, 2022.

[3]MENDES, G. R., et al. Exploring Enzymatic Conformational Dynamics at Surfaces through μ-FTIR Spectromicroscopy. Anal Chem 95, 2023.