Qeios

Peer Review

Review of: "Impedance of a Hydrogen–Fed SOFC Anode: Analytical and Numerical Models Based on the Dusty Gas Transport Model"

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The work is well-organized, with a clear structure and detailed mathematical equations guiding interested readers through the deduction process. The study develops analytical low-current and numerical high-current impedance models for a hydrogen-fed anode of an anode-supported button SOFC, demonstrating the impact of pressure gradient neglect on hydrogen diffusivity estimation.

To enhance clarity and facilitate a smoother understanding, I would like to suggest a few improvements:

Equation (8): It requires an additional assumption, specifically $3D\_{k,w} = D\_{k,h}$, to reach the presented form. While citation [22] includes this assumption, I believe it would strengthen the paper to explicitly mention it in the passage following equation (8).

Equations (15) and (16): These represent the approximate analytical solutions for equations (7) and (8). Including the boundary conditions used to derive these solutions would not only improve readability but also enhance the completeness of the paper.

Numerical Results and Discussion: I appreciate the quantitative comparison and discussion of the applicability of each method. However, regarding the fitting of experimental results, it appears that only the analytical solutions are used. While I understand that the analytical and numerical solutions are established as identical in Figure 2, I believe adding a direct comparison in Figure 6 would provide additional validation and clarity.

Overall, this study presents valuable insights, and incorporating these suggestions could further strengthen its impact and clarity.

Declarations

Potential competing interests: No potential competing interests to declare.