

EDUCATIONAL VOLTAMMETRY: PART 5: "Spontaneous" Decay of Metal Alloys in Cyclic Voltammetry

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Abstract

In this work, we present the cyclic voltammograms of basic (referent) model for the "spontaneous" decay of metal alloys under conditions of cyclic voltammetry, represented by the reaction scheme (1). Effect of rate of electron transfer, effect of the temperature, and effect of the potential signal parameters are investigated theoretically. This model is seen as a cornerstone to understand other chemically induced mechanisms representing decay of metal alloys coupled by various chemical reactions..

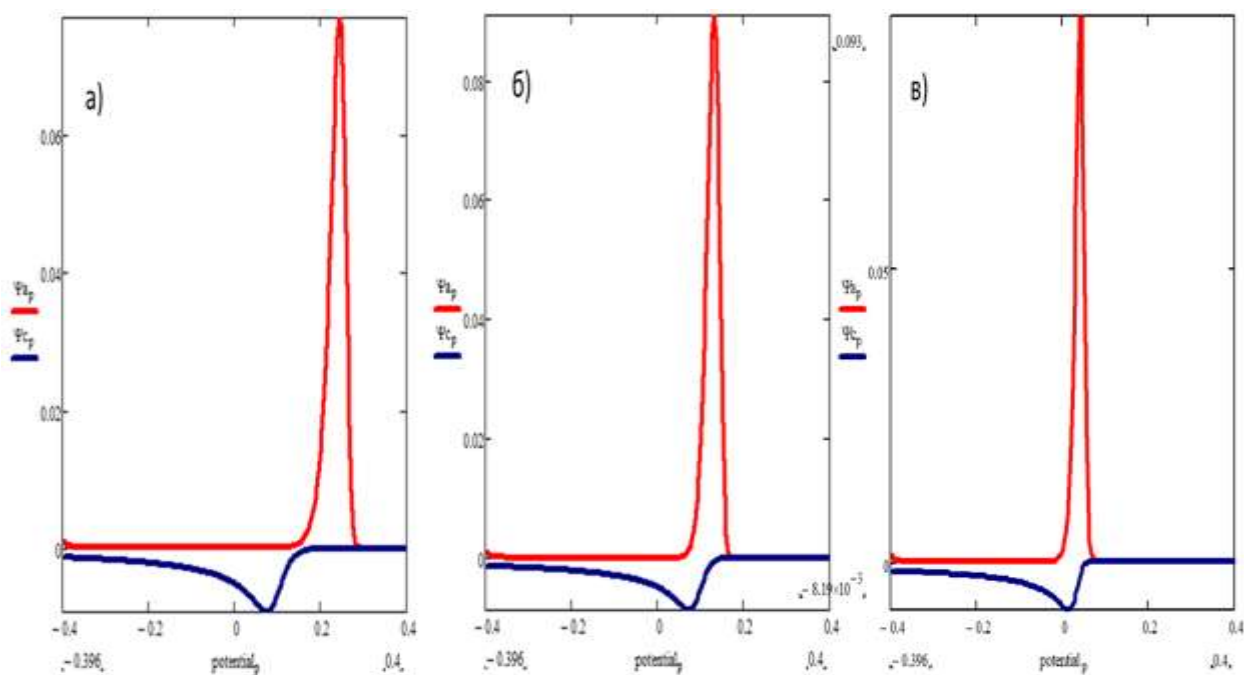
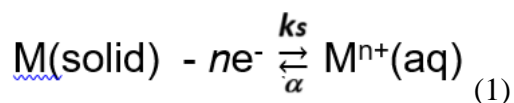


Figure 1. $\text{M(solid)} - ne^- \rightleftharpoons \text{M}^{n+}(\text{aq})$. Voltammograms calculated at $dE = 2 \text{ mV}$, $\alpha = 0.5$, scan rate of 50 mV/s . Voltammograms feature the Effect of the dimensionless kinetic parameter (K) that was set to: 0.01 (a); 0.1 (б) and 1 (B).

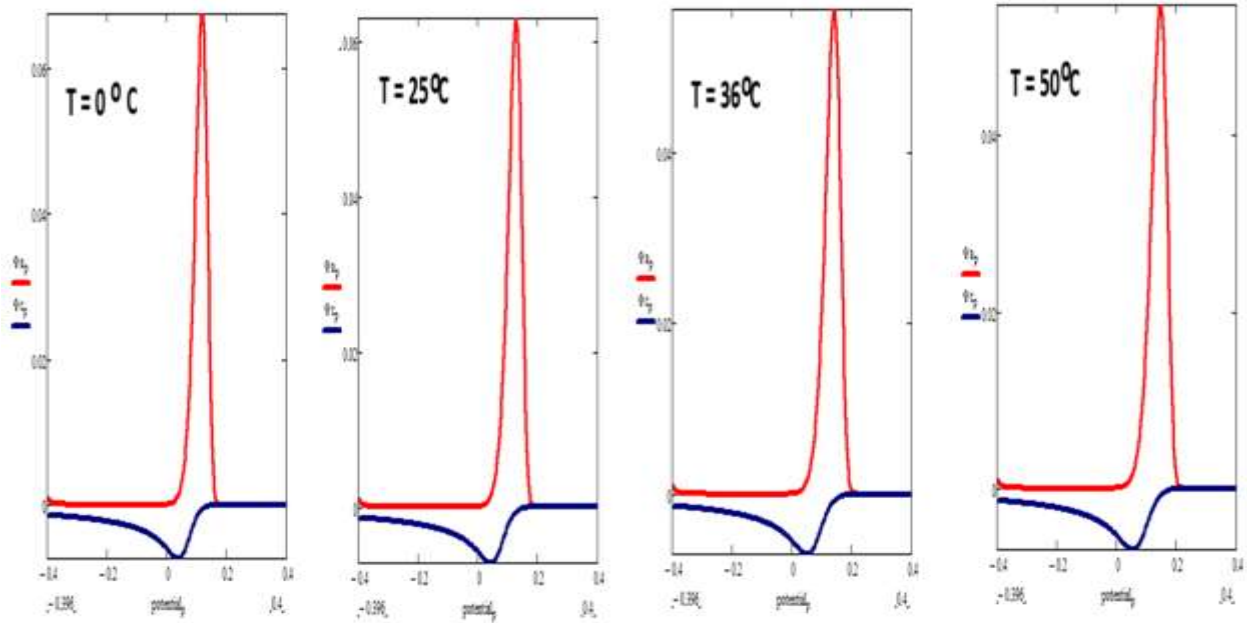


Figure 2. Voltammograms of the “spontaneous” decay of metal alloy ($M(\text{solid}) - ne^- \rightleftharpoons M^{n+}(\text{aq})$.) showcasing the effect of temperature.

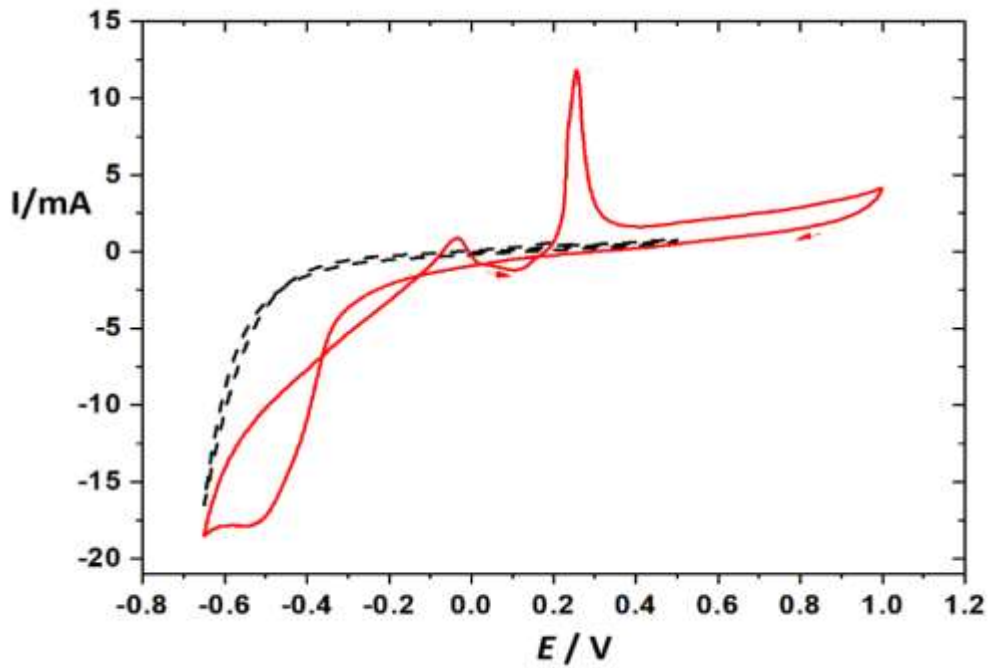


Figure 3. Experimental cyclic voltammograms of metal alloy

References

1. R. Gulaboski, *Journal of Solid State Electrochemistry* 24 (2020) 2081-2081
2. R. Gulaboski, E. S. Ferreira, C. M. Pereira, M. N. D. S. Cordeiro, A. Garau, V. Lippolis, A. F. Silva, *Journal of Physical Chemistry C* 112 (2008) 153-161
3. R. Gulaboski, V. Mirceski, M. Lovric, I. Bogeski, *Electrochemistry Communications* 7 (2005) 515-522.
4. R Gulaboski, V Mirceski, *Macedonian Journal of Chemistry and Chemical Engineering* 39 (2020) 153-166
5. V. Mirceski, R. Gulaboski, *Macedonian Journal of Chemistry and Chemical Engineering* 33 (2014), 1-12
6. V. Mirceski, R. Gulaboski, *Journal of Solid State Electrochemistry* 7 (2003) 157-165
7. M. Janeva, P. Kokoskarova, V. Maksimova, R. Gulaboski, *Electroanalysis* 31 (2019) 2488-2506
8. R. Gulaboski, V. Mirceski, S. Komorsky-Lovric, M. Lovric, *Electroanalysis* 16 (2004) 832-842
9. R. Gulaboski, C.M. Pereira, M.N.D.S Cordeiro, I. Bogeski, F. Silva, *Journal of Solid State Electrochemistry* 9 (2005) 469-474
10. B. Sefer, R. Gulaboski, V. Mirceski, *Journal of Solid State Electrochemistry* 16 (2012) 2373-2381.
11. P. Kokoskarova, Rubin Gulaboski, *Electroanalysis* 32 (2020) 333-344.
<https://doi.org/10.1002/elan.201900491>
12. R. Gulaboski, C. M. Pereira, *Electroanalytical Techniques and Instrumentation in Food Analysis; in Handbook of Food Analysis Instruments* (2008) 379-402.
13. M. Jorge, R. Gulaboski, C. M. Pereira, M. N. D. S. Cordeiro, *Journal of Physical Chemistry B* 110 (2006) 12530-12538.
14. V. Mirceski, D. Guziejewski, L. Stojanov, R. Gulaboski, *Analytical Chemistry* 91 (2019) 14904-14910.
15. V. Mirceski, R. Gulaboski, F. Scholz, *Journal of Electroanalytical Chemistry* 566 (2004) 351-360.
16. R. Gulaboski, M. Chirea, C. M. Pereira, M. N. D. S. Cordeiro, R. B. Costa, A. F. Silva, J. *Phys. Chem. C* 112 (2008) 2428-2435
17. R. Gulaboski, V. Mirceski, S. Komorsky-Lovric, M. Lovric, *Electroanalysis* 16 (2004) 832-842

18. R. Gulaboski, C. M. Pereira, M. N. D. S. Cordeiro, A. F. Silva, M. Hoth, I. Bogeski, *Cell Calcium* 43 (2008) 615-621
19. R. Gulaboski, V. Mirceski, F. Scholz, *Amino Acids* 24 (2003) 149-154
20. V. Mirceski, R. Gulaboski, *Croatica Chemica Acta* 76 (2003) 37-48.
21. F. Scholz, R. Gulaboski, *Faraday Discussions* 129 (2005) 169-177.
22. R. Gulaboski, K. Caban. Z. Stojek, F. Scholz, *Electrochemistry Communications* 6 (2004) 215-218.
23. V. Mirceski, R. Gulaboski, *Journal of Physical Chemistry B*, 110 (2006) 2812-2820.
24. V. Mirceski, R. Gulaboski, B. Jordanoski, S. Komorsky-Lovric, *Journal of Electroanalytical Chemistry*, 490 (2000) 37-47.
25. R. Gulaboski, *Macedonian Journal of Chemistry and Chemical Engineering* 41 (2022) 151-162
26. R. Gulaboski, P. Kokoskarova, S. Petkovska, *Analytical&Bioanalytical Electrochemistry*, 12 (2020) 345-364.
27. V. Mirčeski, R. Gulaboski, F. Scholz, *Electrochemistry Communications* 4 (2002) 814-819
28. M. Jorge, R. Gulaboski, C. M. Pereira, M. N. D. S Cordeiro, *Molecular Physics* 104 (2006) 3627-3634.
29. R. Gulaboski, V. Mirceski, M. Lovric, *Macedonian Journal of Chemistry and Chemical Engineering* 40 (2021) 1-9.
30. R. Gulaboski, P. Kokoskarova, S. Risafova, *J. Electroanal. Chem.* 868 (2020) 114189.
31. R. Gulaboski, V. Mirceski, *Journal of Solid State Electrochemistry* 28 (2024) 1121-1130.
32. V. Mirceski, B. Mitrova, V. Ivanovski, N. Mitreska, A. Aleksovska, R. Gulaboski, *Journal of Solid State Electrochemistry* 19 (2015) 2331-2342.
33. I. Spirevska, L. Soptrajanova, R. Gulaboski, *Analytical Letters* 33 (2000) 919-928.
34. R. Gulaboski, B. Jordanoski, *Bulletin of Chemists and Technologist of Macedonia* 19 (2000) 177-181
35. R. Gulaboski, M. Lovrić, V. Mirčeski, I. Bogeski, M. Hoth, *Biophysical Chemistry* 137 (2008) 49-55.
36. R. Gulaboski, V. Mirčeski, S. Mitrev, *Food Chemistry*, 138 (2013) 116-121.
37. R. Gulaboski, V. Mirčeski, M. Lovrić, *Journal of Solid State Electrochemistry* 23 (2019) 2493-2506

38. V. Mirceski, R. Gulaboski, F. Scholz, *Electrochemistry Communications* 4 (2019) 814-819.
39. Rubin Gulaboski, V. Mirceski, *Journal of Solid State Electrochemistry* 28 (2024) 1121-1130.