

Stability and reactivity of LSGM electrolytes with nickel based ceramic cathodes

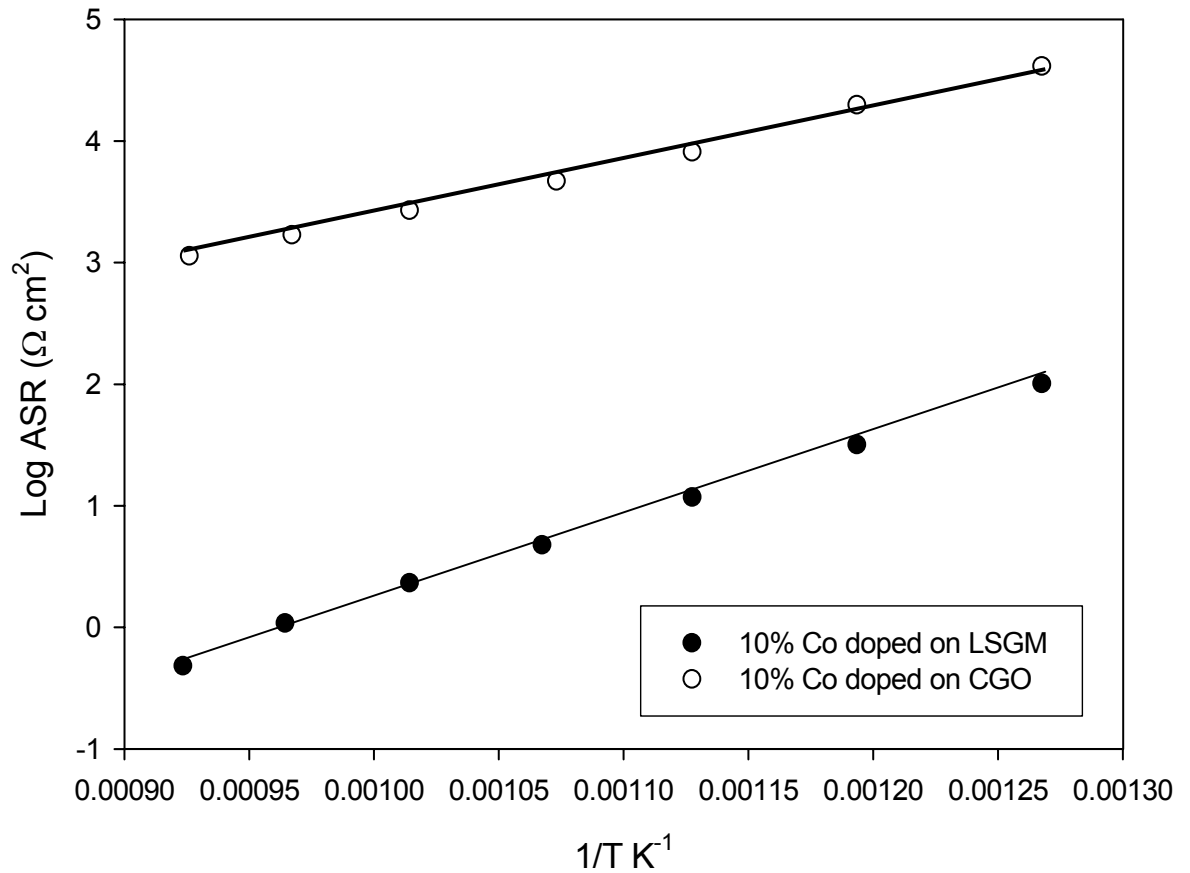
C.N. Munnings¹, S.J. Skinner¹, G. Amow², P. Whitfield²
and I. Davidson²

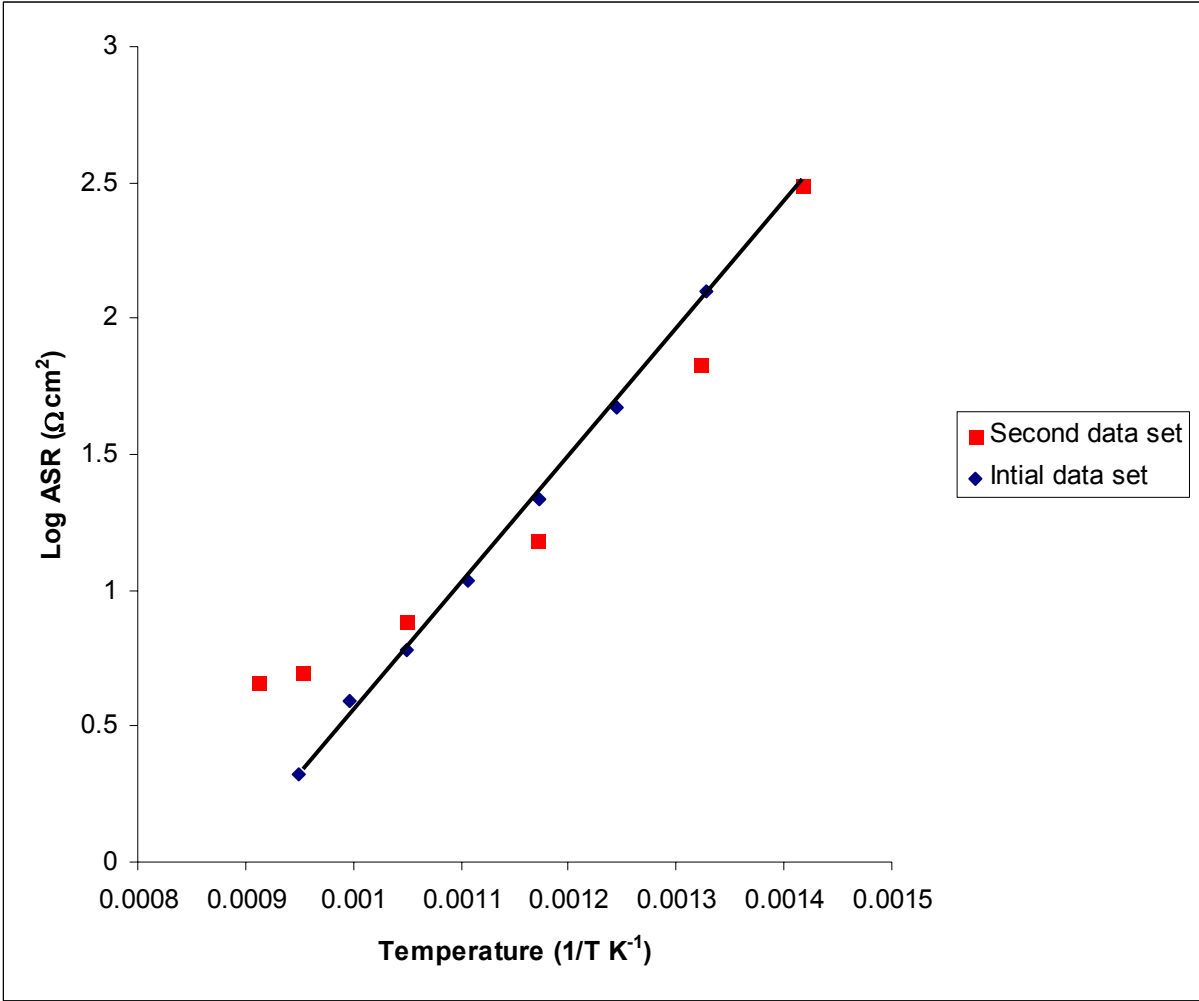
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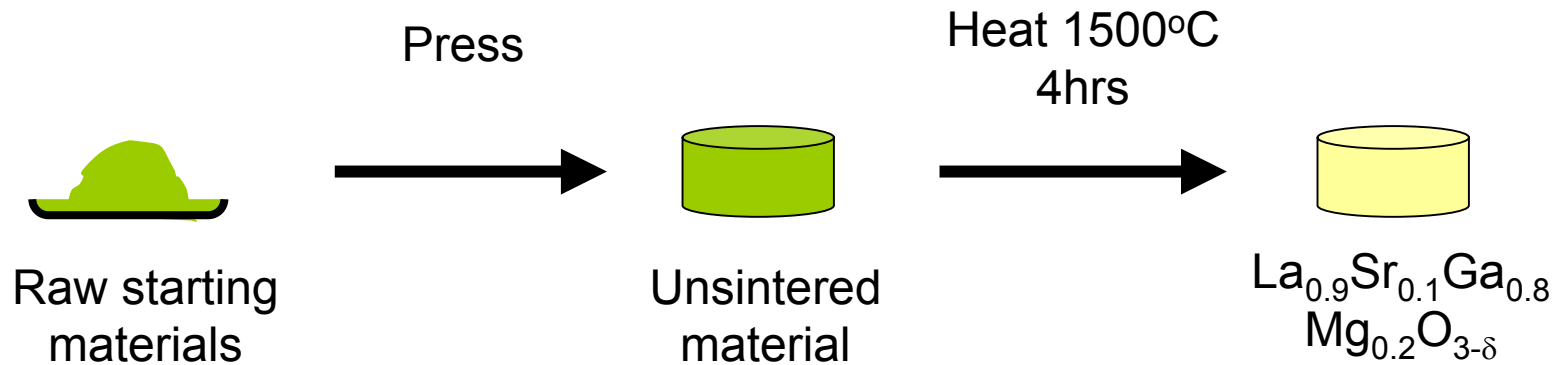
- Introduction and previous work
 - Surface analysis
 - Effect of the surface on the performance of the Cathode
 - Conclusions
 - Further work
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S. Skinner, C. Munnings,
G. Amow, P. Whitfield, and
I. Davidson. *Evaluation of
 $La_2Ni_{1-x}Co_xO_{4+\delta}$ as a
SOFC cathode material.* in
SOFC VIII. 2002. Paris.

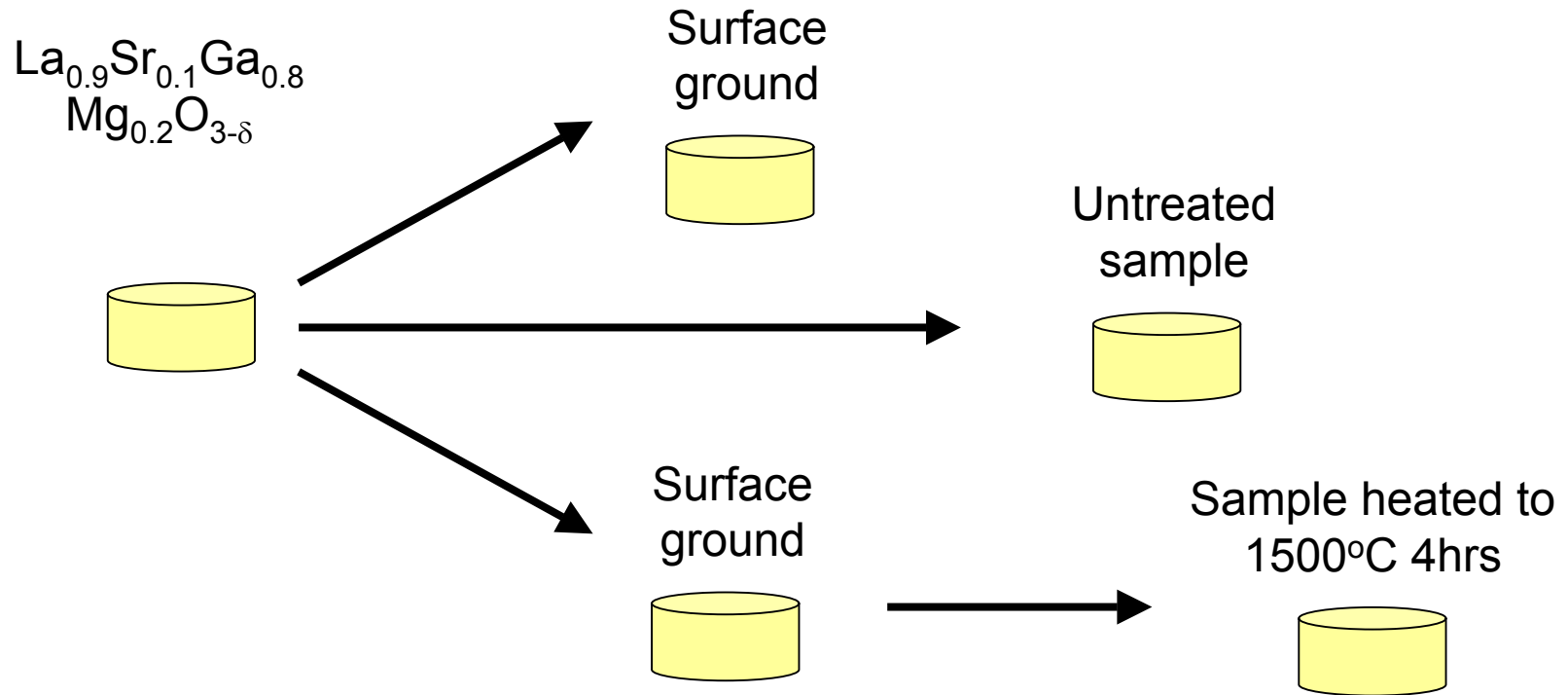




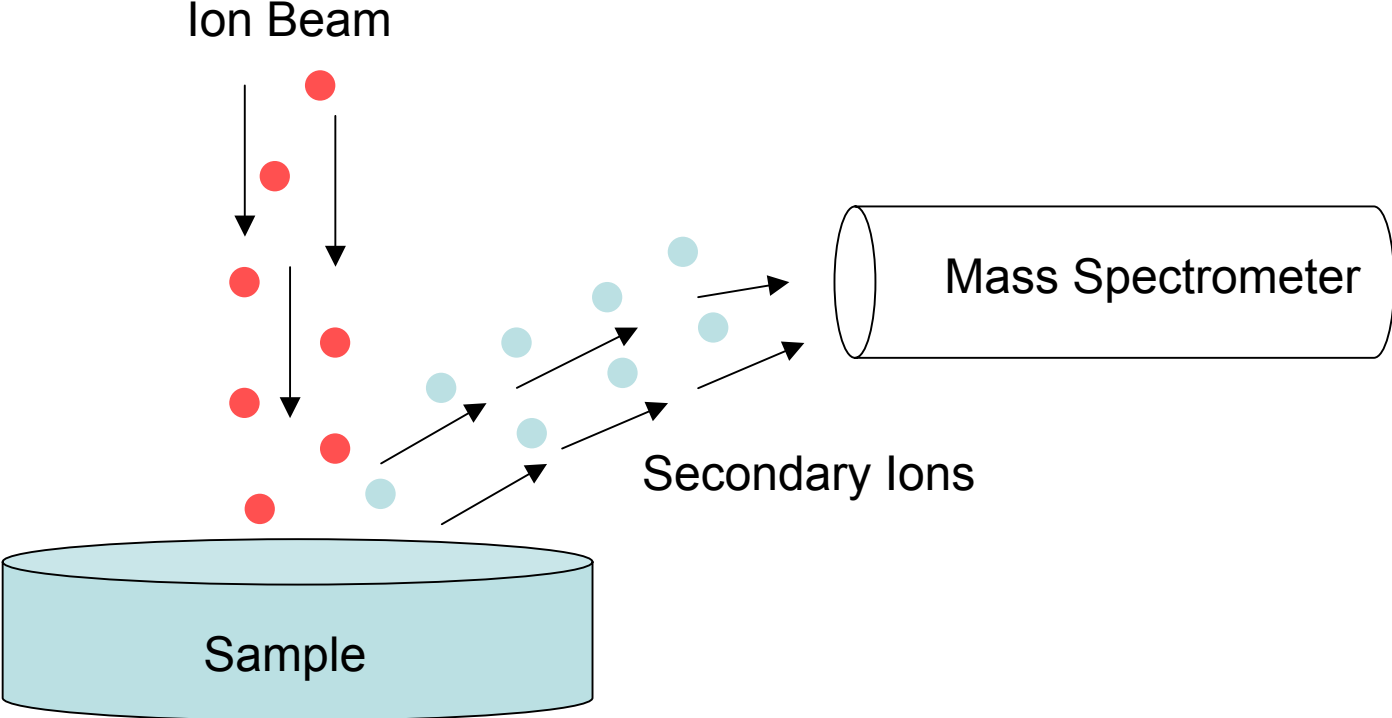
Sample Preparation



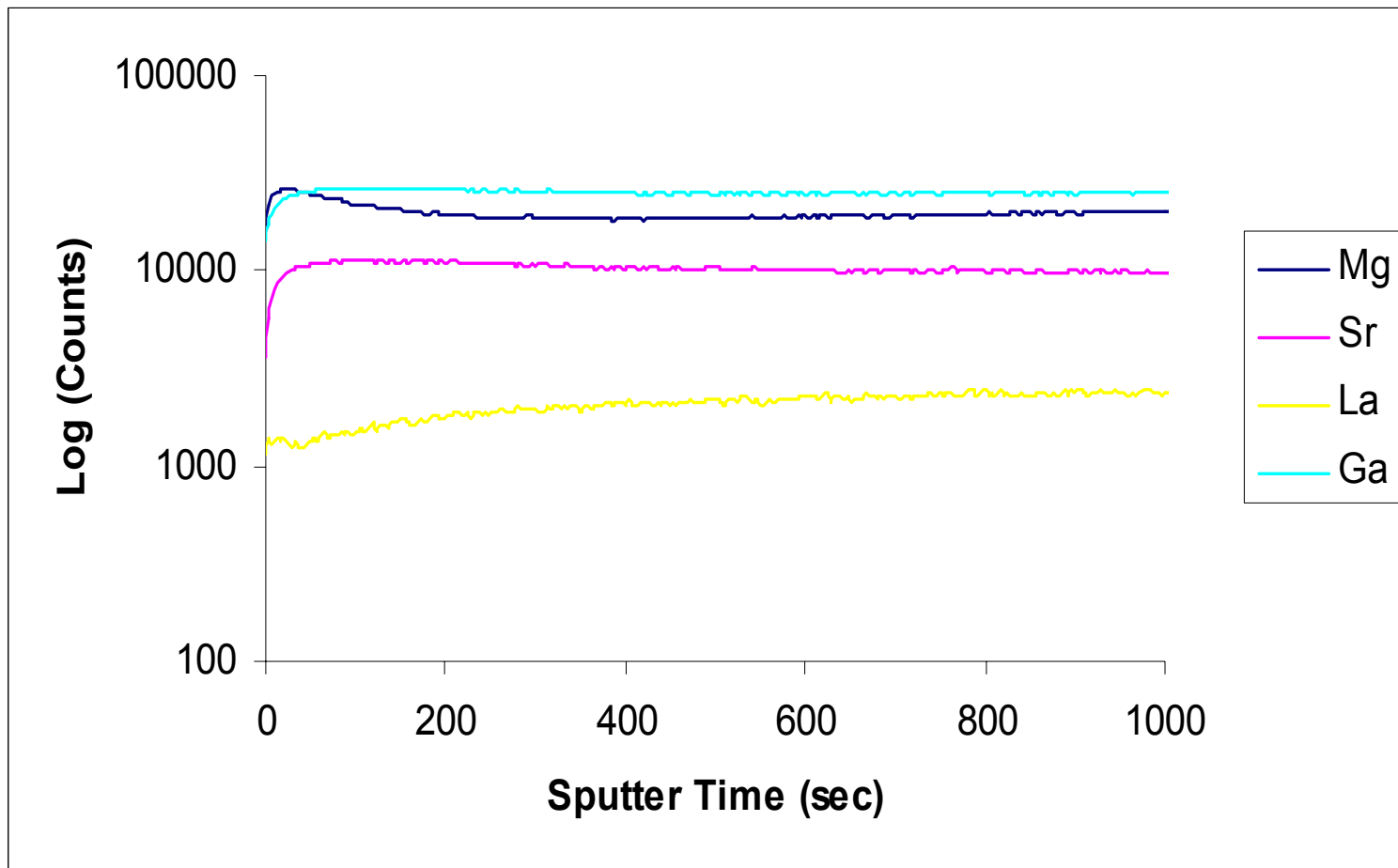
Sample treatment



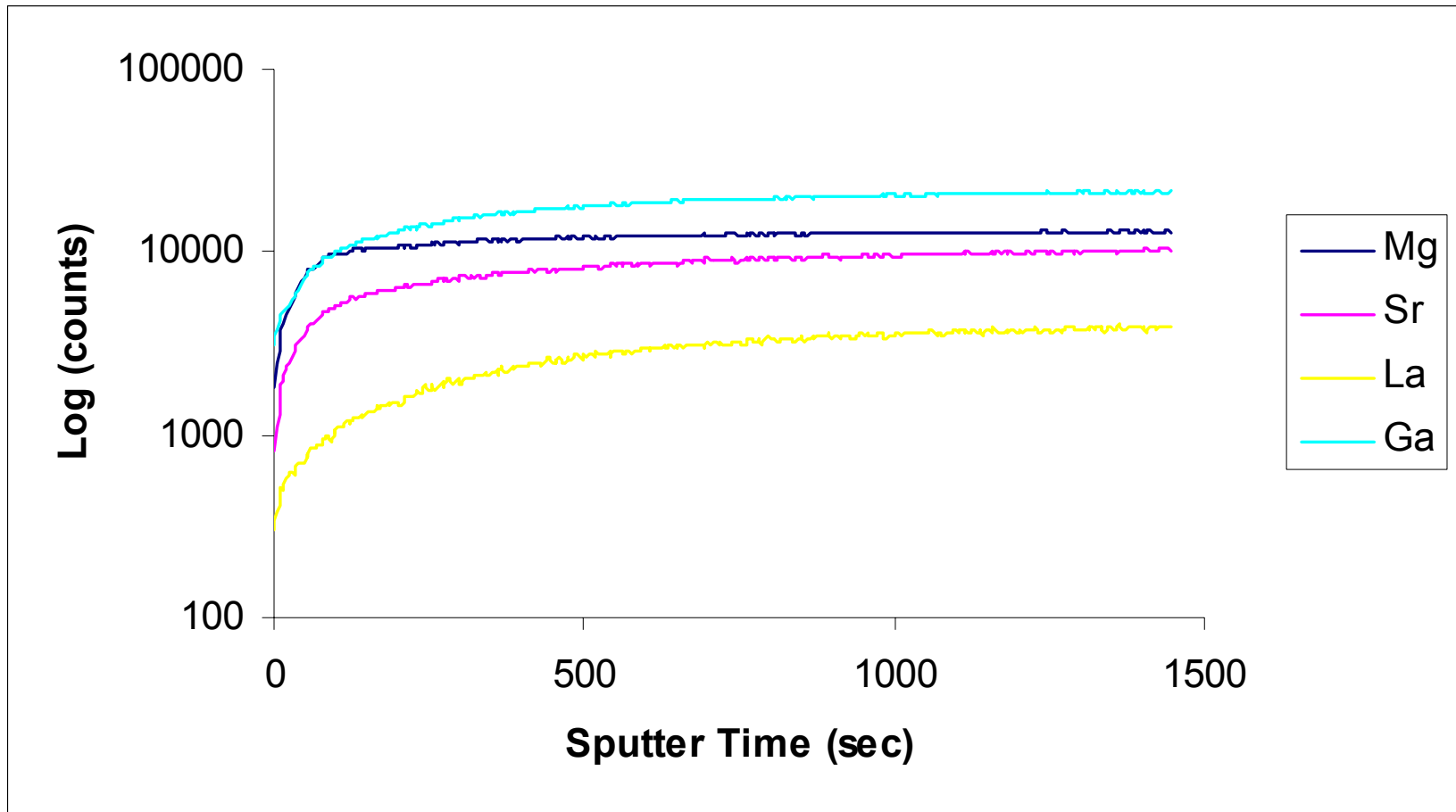
Surface analysis (SIMS)



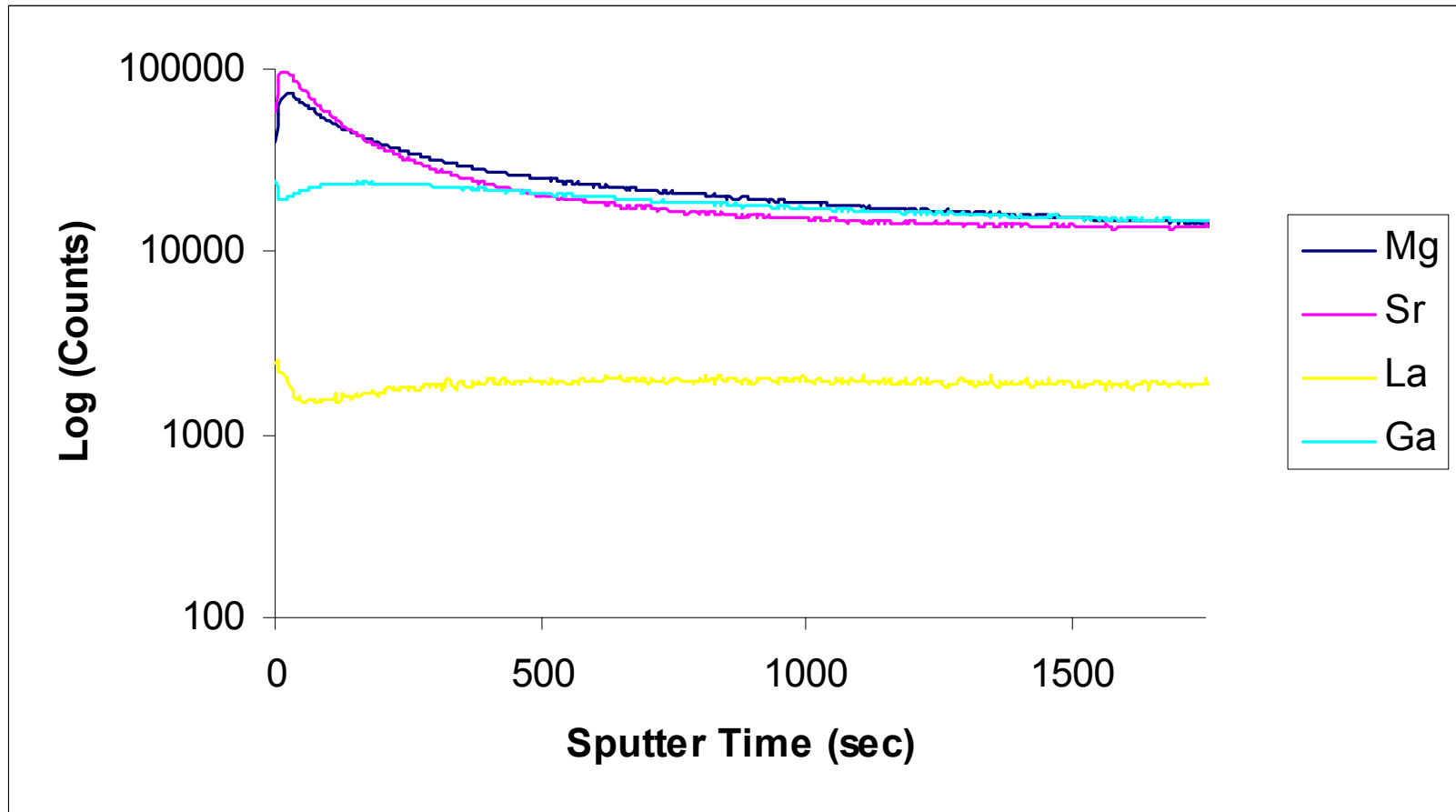
Standard



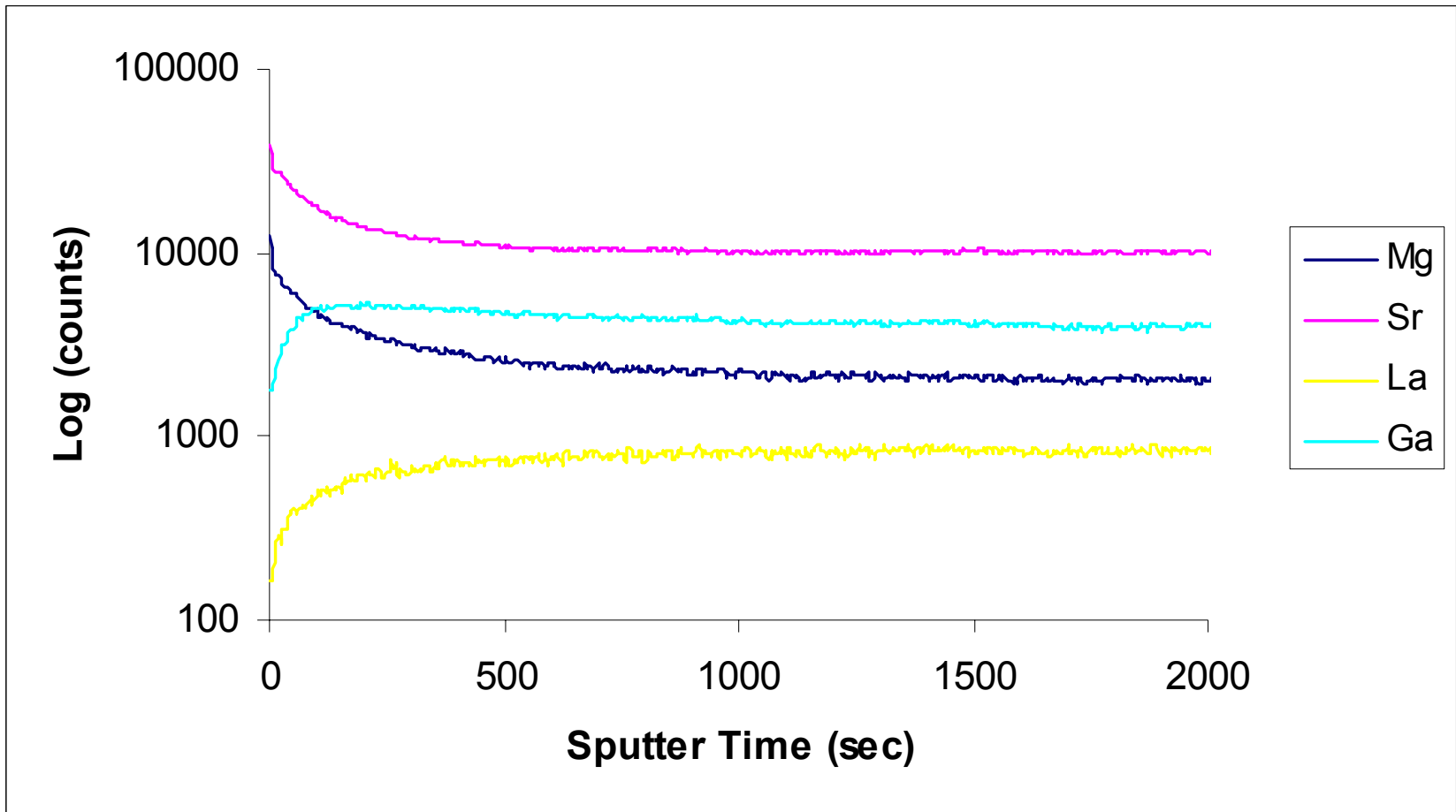
Ground Sample



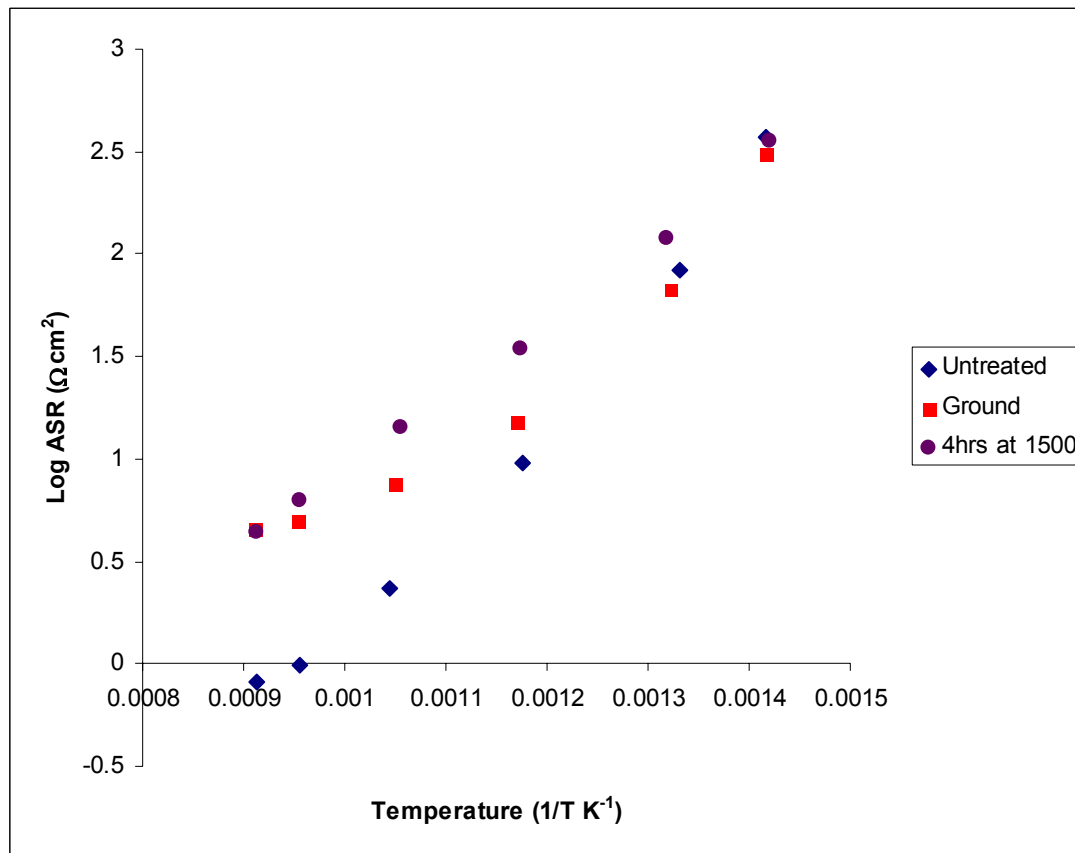
Untreated sample



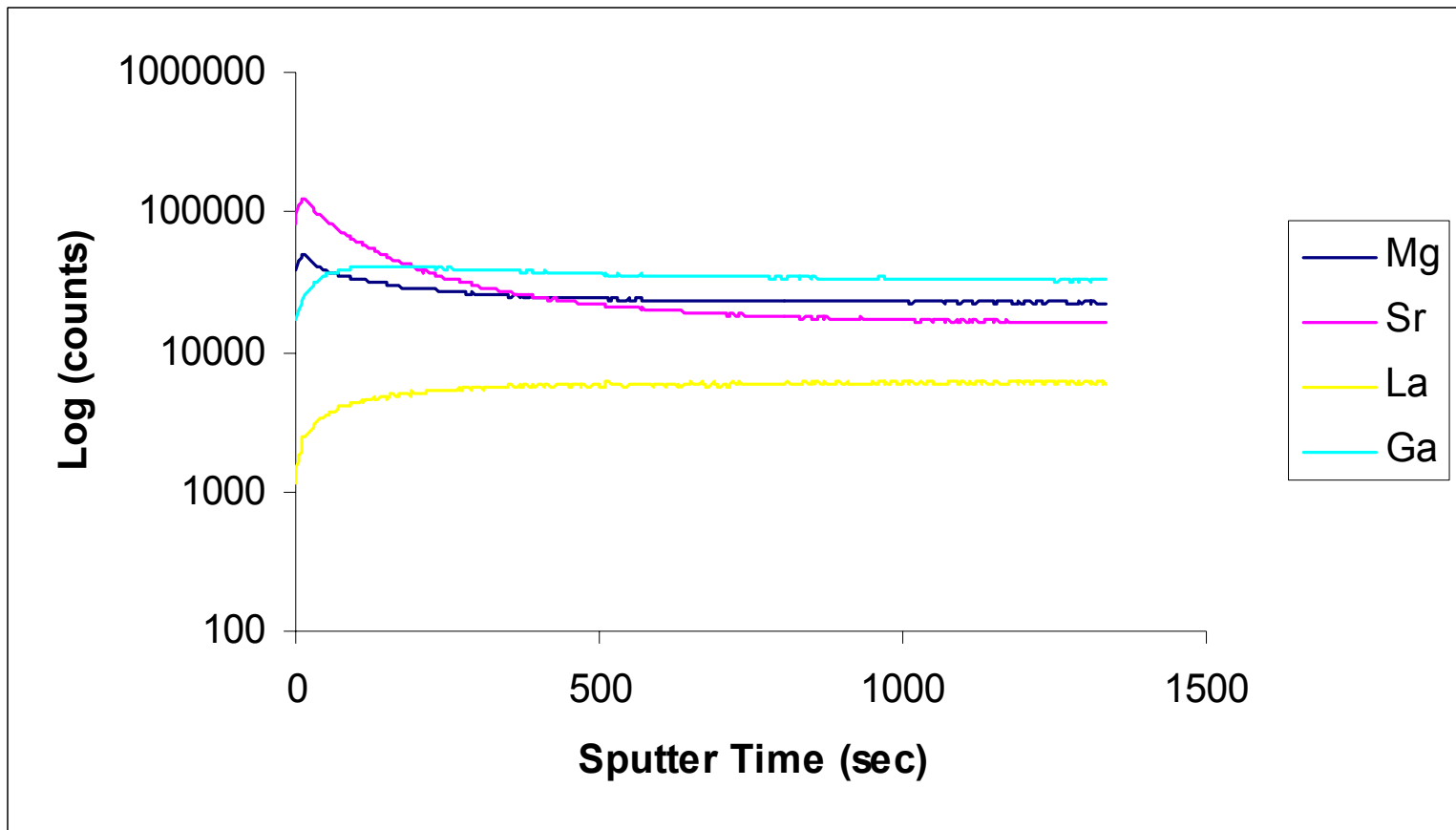
Sample annealed at 1500°C



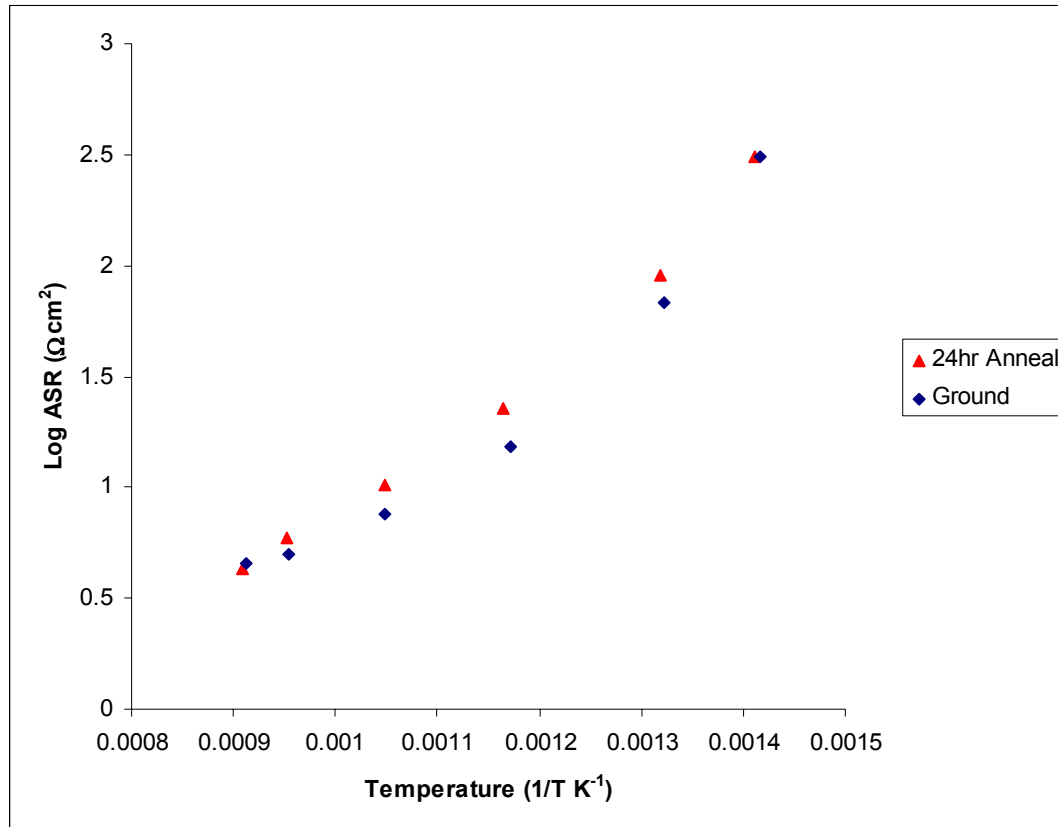
Effect of surface on cathode performance



Sample heated at 1000°C 24hrs



Effect of sample anneal on cathode performance



Conclusions

- The Surface of $\text{La}_{0.9}\text{Sr}_{0.1}\text{Ga}_{0.8}\text{Mg}_{0.2}\text{O}_{3-\delta}$ is chemically active
 - Increased levels of Mg and Sr at the surface of $\text{La}_{0.9}\text{Sr}_{0.1}\text{Ga}_{0.8}\text{Mg}_{0.2}\text{O}_{3-\delta}$ appear to improve the performance of $\text{La}_2\text{NiO}_{4+\delta}$ Cathodes
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Further Work

- What is happening at the interface?
 - Can it be reproduced without heating to 1500°C?
 - What affect is this surface having of the properties of $\text{La}_{0.9}\text{Sr}_{0.1}\text{Ga}_{0.8}\text{Mg}_{0.2}\text{O}_{3-\delta}$?
 - What is the effect of the surface morphology on the performance of the $\text{La}_2\text{NiO}_{4+\delta}$ Cathode?
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Acknowledgements

We would like to acknowledge the British Council and the National Research Council of Canada, for supporting this project through the funding of a studentship (CNM) and Sarah Fearn (Imperial College), for her advice and guidance on the use of SIMS and other surface analysis equipment.

