

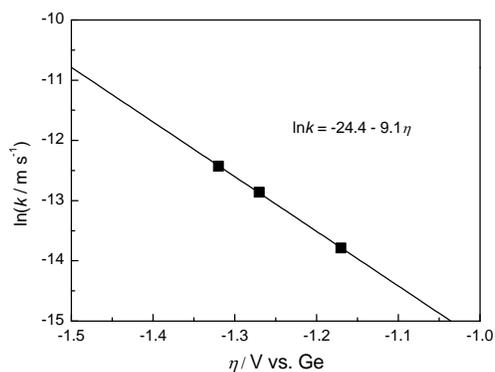
Electrodeposition of germanium from the ionic liquid  
1-butyl-1-methylpyrrolidinium dicyanamide- Electronic  
Supplementary Information

Minxian Wu<sup>a</sup>, Neil R. Brooks<sup>b</sup>, Stijn Schaltin<sup>a</sup>, Koen Binnemans<sup>b</sup>, Jan Fransaer<sup>a,\*</sup>

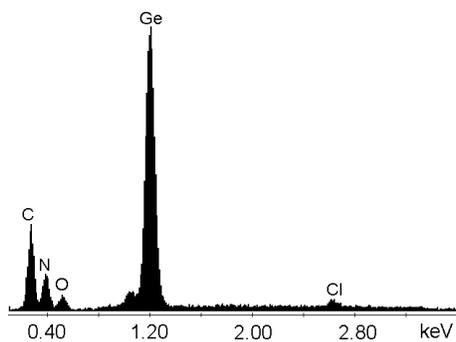
<sup>a</sup> *Department of Metallurgy and Materials Engineering, KU Leuven - University of Leuven,  
Kasteelpark Arenberg 44, P.O. Box 2450 B-3001 Heverlee, Belgium*

<sup>b</sup> *Department of Chemistry, KU Leuven - University of Leuven, Celestijnenlaan 200F, P.O. Box  
2404, B-3001 Heverlee, Belgium*

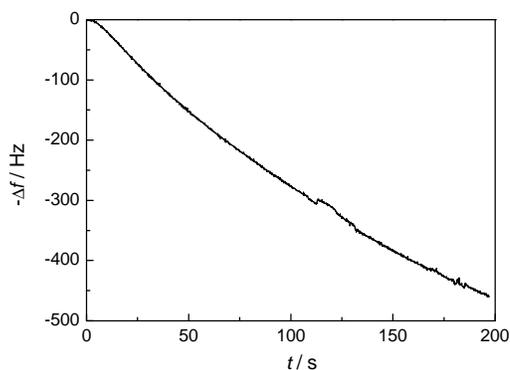
*\* Corresponding author, jan.fransaer@mtm.kuleuven.be*



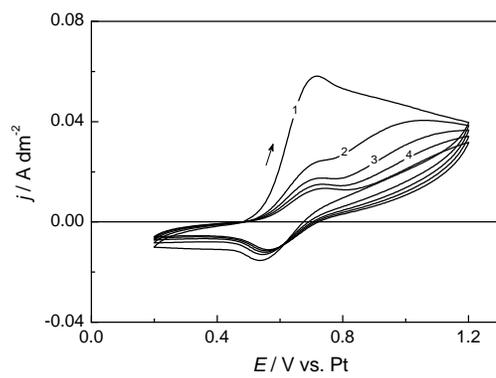
**Figure 1:** Plot of  $\ln k$  vs. overpotential  $\eta$  in the solution of 0.1 M  $[\text{GeCl}_4(\text{BuIm})_2]$  in  $[\text{BMP}][\text{DCA}]$  at 50 °C. The working electrode was a platinum disk ( $\phi = 3$  mm) and the counter and reference electrodes were *n*-type germanium.



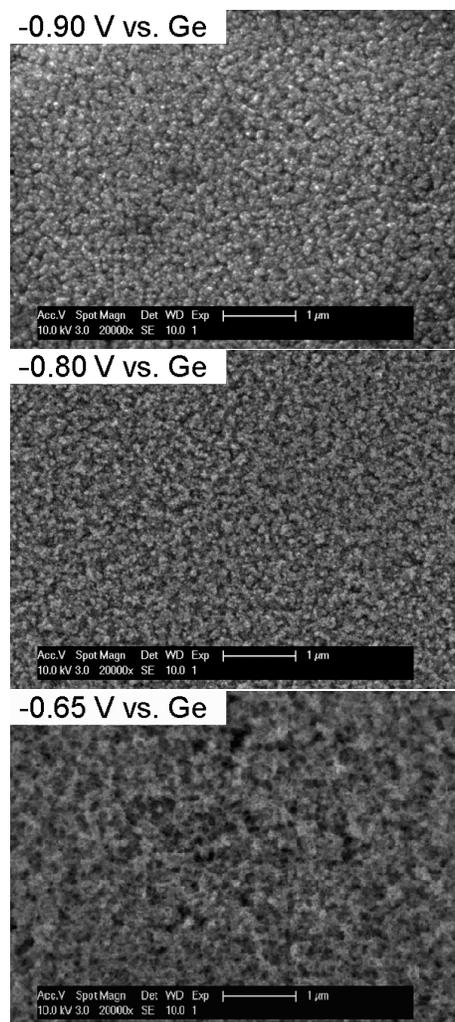
**Figure 2:** EDX spectrum of the organic layer formed on *n*-Type germanium wafer counter electrode during electrodeposition of germanium in a 0.1 M  $[\text{GeCl}_4(\text{BuIm})_2]$  solution in  $[\text{BMP}][\text{DCA}]$ .



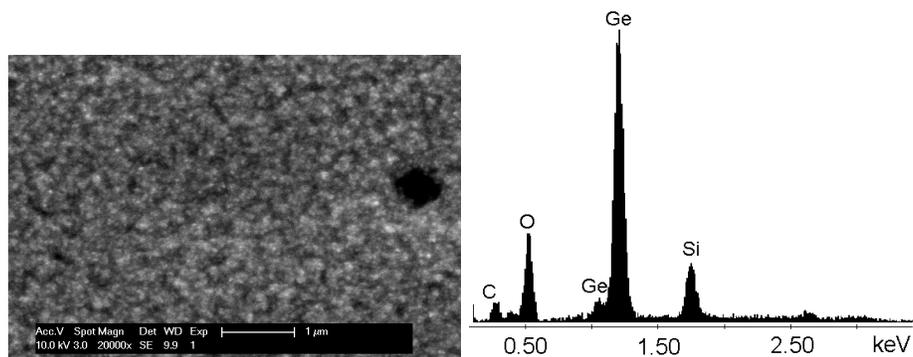
**Figure 3:** Frequency change on a platinum coated EQCM crystal in neat  $[\text{BMP}][\text{DCA}]$  at room temperature, and a constant current  $0.05 \text{ A dm}^{-2}$  was applied. The counter and reference electrodes were platinum.



**Figure 4:** Sequential cyclic voltammograms of a 0.05 M ferrocene solution in [BMP][DCA] on a platinum disk ( $\phi = 1 \text{ mm}$ ) at room temperature. The counter and reference electrodes were platinum and the scan rate was  $5 \text{ mV s}^{-1}$ .



**Figure 5:** SEM images of the germanium film deposited on a copper disk from 0.1 M  $[\text{GeCl}_4(\text{BuIm})_2]$  in 1:1 molar ratio  $[\text{BMP}][\text{DCA}]$  and  $[\text{BMP}]\text{Cl}$  at 100 °C. The counter electrode was an *n*-type germanium wafer.



**Figure 6:** SEM images and EDX spectrum of the germanium film deposited on a hydrogen terminated *n*-type silicon wafer from 0.1 M  $[\text{GeCl}_4(\text{BuIm})_2]$  in 1:1 molar ratio  $[\text{BMP}][\text{DCA}]$  and  $[\text{BMP}]\text{Cl}$  at 100 °C, applied potential: -0.75 V (vs. Ge), theoretical thickness: 0.40 μm. The counter electrode was an *n*-type germanium wafer.