

# Experimental report

22/12/2020

**Proposal:** 9-10-1571

**Council:** 10/2018

**Title:** Determination of interfacial width between two immiscible electrolyte solutions

**Research area:** Chemistry

**This proposal is a new proposal**

**Main proposer:** Ali ZARBAKSH

**Experimental team:** Andrea TUMMINO  
Ernesto SCOPPOLA  
Ali ZARBAKSH

**Local contacts:** Armando MAESTRO  
Andrea TUMMINO

**Samples:** dichloroethane

| Instrument | Requested days | Allocated days | From       | To         |
|------------|----------------|----------------|------------|------------|
| FIGARO     | 3              | 3              | 31/01/2020 | 03/02/2020 |

## Abstract:

The structural study of the interface between a polar liquid phase and water. To examine the structure of the bare interface between the two solvents of interest (water/dichloroethane) using interfacially pure liquids and to determine the intrinsic interfacial width. To extend the investigation to examine the interfacial structure between electrolyte solutions of different concentration. to employ extensive isotopic substitution to enable the partial structures to be obtained.

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| <b>1</b>   | <b>PRINCIPAL INVESTIGATOR</b> |
| Name and institution of the Principal Investigator   |                               |
| Dr A Zarbakhsh<br>Department of Chemistry<br>Queen Mary University of London<br>UNITED KINGDOM |                               |

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|--|---------------------------|
| <b>2</b>   | <b>EXPERIMENT DETAILS</b> |
| Experiment: 9-10-1571  |                           |
| Title: Determination of interfacial width between two immiscible electrolyte solutions |                           |
| Instrument: FIGARO   |                           |
| Dates scheduled: 31/01/2020 To: 03/02/2020   | No. Days allocated: 3     |
| Date of experimental report: 22/12/2020  |                           |

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| <b>3</b>   | <b>EXPERIMENT OBJECTIVES</b> |
| <p>The experimental plan were to measure;</p> <p>A series of reflectivity profiles will be measured for water/ DCE over a wide temperature range 10 to 30 °C. The corresponding surface tension for the system will be determined prior to the experiment (i.e. <math>\sigma</math>capillary). This would enable us to decouple the intrinsic width of the oil-water interface from that of the capillary-wave contributions.</p> <p>Once a suitable methodology has been established, the study will be extended to the interface between electrolyte solutions. Initially, the addition of a single potential determining salt such as tetraethyl ammonium tetraphenylborate (0.1 and 0.5 mol/L) will be used for simplicity. In this case the potential at the interface will be dependent on the partition between the two phases according to the solubility in the two phases. The interface will be studied with a salt that will polarise the interface positive, negative and close to zero volts on the normal scale .</p> |                              |

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| <b>4</b>  | <b>EXPERIMENT REPORT</b> |
| <p>After the initial alignment experiment, <b><u>there was an emergency shutdown of the reactor</u></b> because of the drop in the water level of the river.</p> <p>The experiment was <b>cancelled</b> and we are awaiting rescheduling of this experiment. This has not yet been done because of the Covid situation and travel restrictions.</p> |                          |

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| <b>5</b>  | <b>LIKELY OUTCOMES FROM EXPERIMENT</b> |
| <i>Please indicate what the experiment is likely to lead to by putting an 'x' next to one or more of the possible outcomes below.</i> |  |
| <i>Likely outcome</i>   |  |
| Journal publication   | NA                                     |
| Data for thesis   | NA                                     |
| Follow-up experiment at ILL   | <b>YES</b>                             |
| Follow-up experiment at another facility  | NA                                     |
| Other   |  |
| No outcome anticipated  | -                                      |

|          |   |
|----------|---|
| <b>6</b> | <b>SUGGESTIONS FOR IMPROVEMENTS TO YOUR EXPERIMENT, EQUIPMENT OR THE FACILITY</b> |
| NA       |   |