

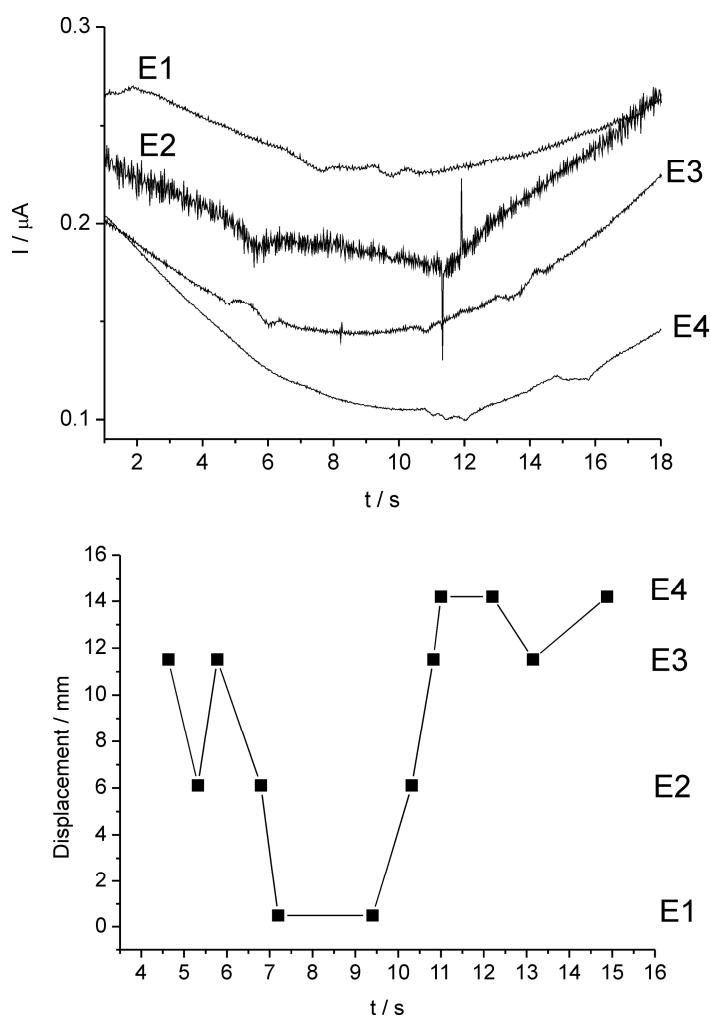
# A Photoelectrochemical method for tracking the motion of *Daphnia magna* in water

N.V. Rees & R.G. Compton

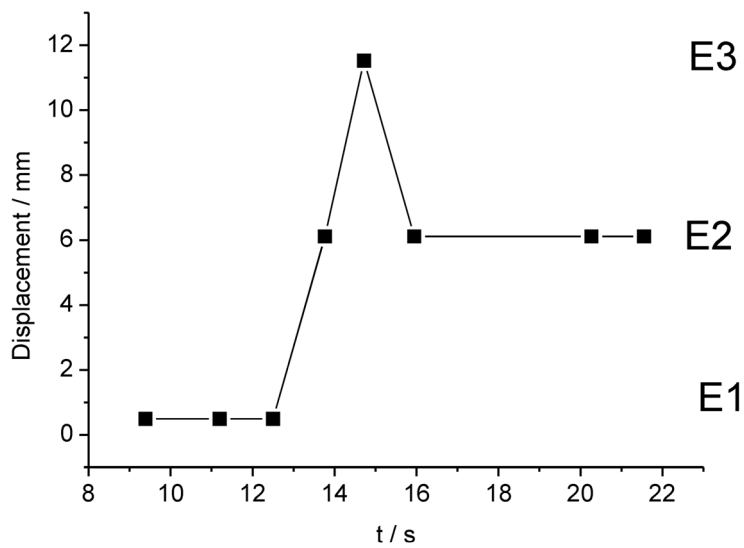
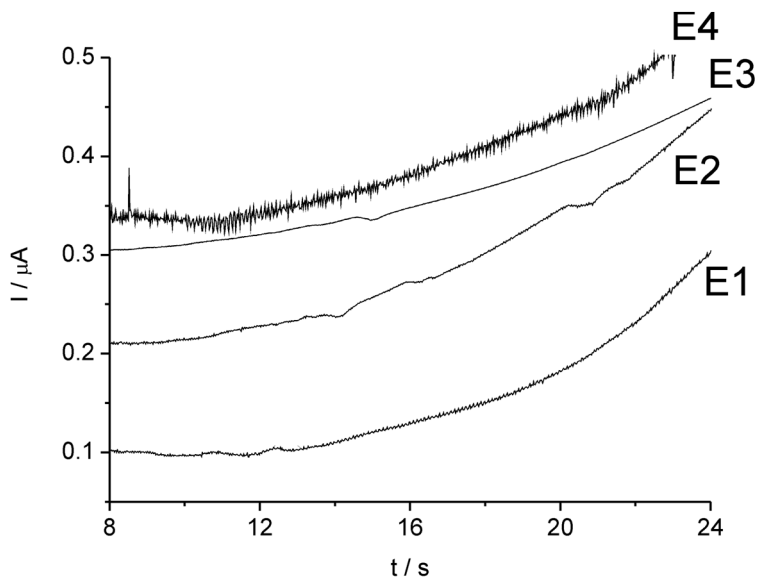
## Supporting Information

### SI1. Additional data

Current-time and displacement time plots analogous to figures 3 and 4 in the main article are given for separate “swims” of the daphnid.



In this figure, the mean speed is  $3.4 \text{ mm s}^{-1}$ , with peak speeds of  $6.3$  and  $7.3 \text{ mm s}^{-1}$ .



Here the mean speed is  $1.3 \text{ mm s}^{-1}$  with a peak speed of  $5.0 \text{ mm s}^{-1}$ .

## SI2. Summary of the results from Ref. 5

At the time of submission, reference 5 (N.V. Rees & R.G. Compton, *Chem. Asian J.*) has yet to be published and we provide a brief summary here to assist the reader.

The aim of that paper was to prove the concept of monitoring particles in motion using the same photoelectrochemical methodology as in this present work. The experimental set-up was identical, except from there being a fifth electrode in the electrochemical cell.

A flat glass plate was placed on top of the cell, and steel ball-bearings (with diameters in the range 1-9mm) were rolled across it. As the balls passed over each electrode, their shadows caused dark transients to be observed on the current-time response (see below).

From this effect, we were able to use basic Newtonian kinematics to measure the ball diameter, and its speed and direction of travel. In separate experiments using two balls, we were able to determine these quantities for each ball, and where a collision occurred, these quantities were measurable both before and after contact, enabling energy losses, and a coefficient of restitution (0.97 for steel-steel contact) to be calculated that accorded very well with literature.

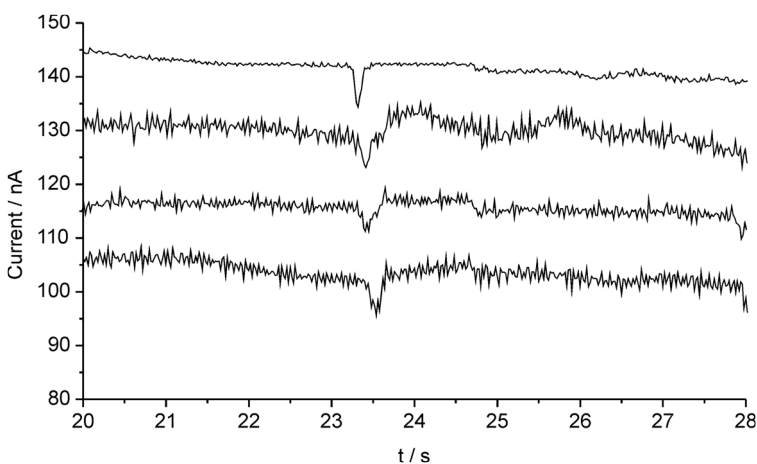


Figure showing typical current-time plot showing dark transients recorded at electrodes 1-4 (top to from bottom).

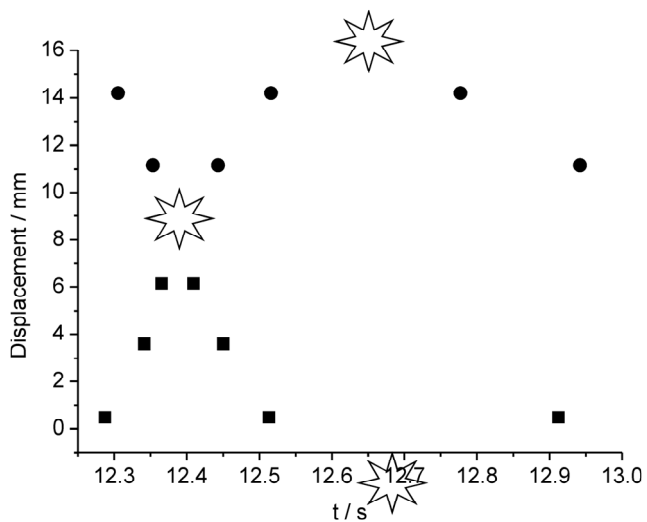


Figure showing position vs. time for ball 1 (■) and ball 2 (●) on collision paths. Collisions occur between ball 1 and 2, and between each individual ball with barriers at each end of the top-plate. Displacement is measured with respect to electrode 1.