**Acoustofluidic Olympics**

**Ideas and suggestions**

* The point of this session is to see the whole acoustofluidic system and exchange ideas on a one-to-one basis in a ways that don’t always happen with oral and poster presentations.
* Ideally this session should be like a trade show, except instead of having the latest carefully arranged manicured products, your latest actual cutting edge research will be on show.
* However, we realise that not all research is sufficiently portable to bring or robust enough to demonstrate. We don’t expect everything to work on the day, if you feel the chances of your system working are too slim then any simple example of acoustofluidics would be good. M Faraday’s paper ["On a Peculiar Class of Acoustical Figures" Phil. Trans. Roy Soc. (1831) 121 299-340](http://resource.isvr.soton.ac.uk/FDAG/Cross-faculty%20UAUA%20centre/e-papers/Faraday.pdf) and JWS Rayleigh's books “The Theory of sound” are both good sources of inspiration for small acoustofluidic experiments. The simplest acoustofluidic experiment I know is to put your finger under a slow running tap, look closely you’ll see waves form above your finger and the wavelength changes as you move your finger from slow to fast running parts of the stream of water.
* In general acoustofluidics is the use of vibrations to manipulate fluids and particles in fluids but, for the purposes of these demonstrations we will also permit Chladni figures where solid particles move on solid surfaces.
* We hope the Olympics will develop to show how Acoustofluidics is progressing year-on-year.

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| **Ideas for ‘games’** | **e.g.** | **Measured quantities** |
| *Longest distance* travelled, by a particle or a droplet | Movement across a surface or through a tube | DistanceEnergy/ meter |
| *Fastest movement* of a particle or a droplet | Movement across a surface or through a tube | SpeedPower/velocity |
| *Greatest* pump flow rate | Using acoustic streaming | Flow rate with no head |
| *Highest* pump head height | Using acoustic streaming | Head height |
| *Strongest* Particle Trap |  | Maximum flow velocity where particles are held when sound is first turned on. |
| *Weight lifting* levitation (in air) | Lift a metal plate ~0.1 mm. Or hold at a node | Maximum weight lifted |
| *Smallest/ largest*, aerosol generation | Nebuliser | Minimum/maximum drop diameter. Volume of fluid suspended/min |
| Filter Smallest/ largest | Possibly using very high and very low frequencies | Particle diameter. At 50 % particle removal.  |
| Air Filter | A filter for droplets or solid particles |  |
| Concentrator | Concentration of particles | Input flow-rate when, Output/input concentration =10. Or, highest concentration factor. For 1 and 5 µm particles. |
| Separator | Separation of two or more particles/droplets of similar size  |  |
| Mixer | Mix two or more liquids or suspensions |  |
| Transfer particles between liquids |  | Liquid carry over at a high particle concentration |
| Acoustofluidics combined with sensors | For measuring particle or fluid characteristics via their spectra (IR, DEP, optical, dielectric etc.) or by immunology or electrochemistry. | Accuracy in characterising a set of known suspensions |
| Sonoporation |  |  |
| Sonoluminescence |  | Light output |
| Sonochemistry |  |  |
| Toys, teaching aids and novel systems | Chladni plates, cooked spaghetti wave guides | Non-quantitative judging. Just how much they inspire the judges |
| Maths and models |  | Must be quantifiable within the 15 min judging period |

**Just a few hints:**

* Devices should be safe, not leak and not hold more than 100 ml of liquid (unless permission is obtained from the organiser, larger volumes will be permitted if floods and spillages can be well contained).
* Risk assessment forms will be sent to you and must be returned before the event.
* No live biological cells/organisms permitted.
* Mains operated systems will be PAT tested on arrival.

**Olympic suggestions**

* This Olympics is not very competitive but we do hope to quantify the output of each system. To achieve this we ask that in addition to working to get the best operation from your system you help fellow presenters get the best out of their system.
* Measurements will be carried out by a judging panel at during the Session (with assistance from the contestants if needed).
* Measurements should take no more than 15 min.
* Who chooses the tests? Contestants should choose their own set of tests and supply measuring equipment if needed. If tests defined by the contestants do not cover all bases or they are too complex to perform, the judges can add further tests or remove tests.
* The same tests will also be applied to all other devices in the category.

Entering a device into more than one category (e.g. fastest movement and movement of smallest particle is encouraged.)

**Olympic session outline**

1. The session will start with demonstrations of some of the most portable devices from the front of the hall with interaction from the “session chairs”.
2. The audience will be free to go to each demonstration and observe, ask questions or in some cases test for themselves.

The table quantifying the acoustofluidic achievement will be completed and displayed.

1. Part 2 continued without school children

School children will be invited to parts 1 and 2 only. The third part is to allow time for those giving demonstrations to also move around and see demonstrations put on by other people.

**If you live far away**

* Let us know if you are not able to bring all of the basic equipment that you need (such as lighting, amplifiers, microscopes and cameras).
* We will do our best to provide equipment that you cannot bring but you must contact us in advance to arrange this (no later than Monday 16th April).
* We will assess your needs pragmatically: If you are travelling from overseas and need to negotiate customs we will give you priority; if you are coming from Britain we may still try to help or, we may ask you to bring extra equipment to help others.