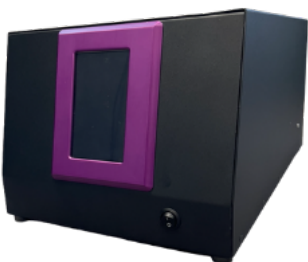


IonField Systems (IFS) is an advanced technology company dedicated to the manufacturing of plasma cleaning products that enable laboratories to protect against shortages, achieve better science, and reduce environmental waste.

The PureTIP Liquid Handler Companion (LHC) System by IFS utilizes a low temperature 'cold' atmospheric-pressure plasma process to destroy organic molecules residing on or inside pipet tips thereby enabling plastic tips to be repetitively reused and eliminating the need for solvent rinsing of all types of tips. On average, in 30 seconds, the PureTIP LHC produces dry, clean tips ready for immediate reuse.

Configured in the 96 and 384-well formats, PureTIP LHC easily integrates within widely used automated liquid handling platforms.

PureTIP LHC improves the reproducibility of results, shortens automation cycle times, reduces the number of lost runs, and eliminates environmental waste and liquid handling disposables. The result is a more effective and productive lab operation.



PureTIP LHC  
Components:  
PlasmaCharger  
Controller and  
Cleaning Station

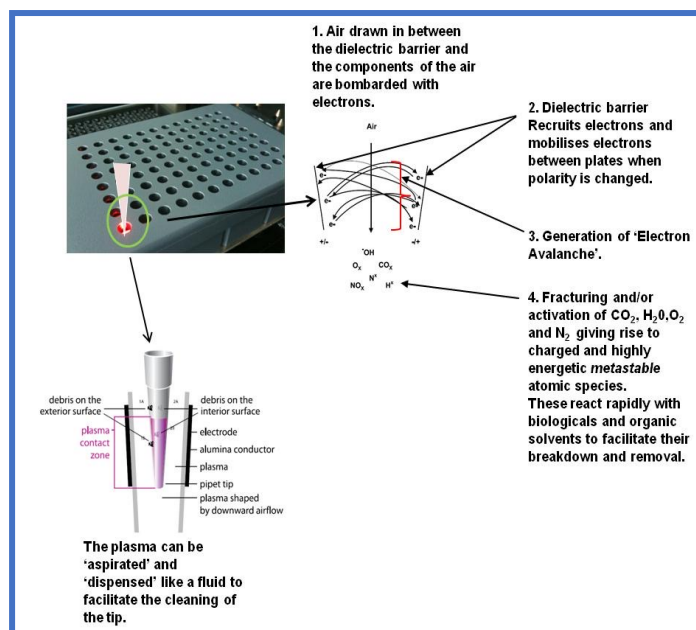
## Introduction

In this poster, we describe the evaluation of the PureTIP LHC cleaning system for use with disposable tip liquid handling systems and present key data from case studies. In these studies, cold plasma tip cleaning was implemented into screening workflows in a range of biological assays requiring compound or nucleic acid transfers.

## Context

Within the pharmaceutical industry the handling and transfer of chemical compounds represents a critical step within the drug screening workflow. A key issue to overcome during implementation of automated liquid handling procedures is the potential loss or carryover of compounds during bulk transfers or during the preparation of serial dilutions. The failure to adequately address this issue can result in an increased false positive or negative hits and an inaccurate determination of compound potency following serial dilution.

## Mechanism for the generation of 'cold plasma'



Disposable tips are widely used to eliminate the risk of carry-over. However, replacing disposable tips can carry a heavy financial burden. Screening workflows therefore routinely incorporate wash steps with organic solvents to enable the re-use of disposable tips.

In recent years the development of instrumentation utilizing cold or atmospheric plasma has provided an attractive alternative technology that may allow screening scientists to establish wash protocols which enable the multiple re-use of disposable tips. Cold plasma is an ionized gas consisting of highly reactive species capable of decomposing organic contaminants by way of electrophilic and nucleophilic reactions (Ulrich Kogelschatz; 2003).

## Materials and Methods

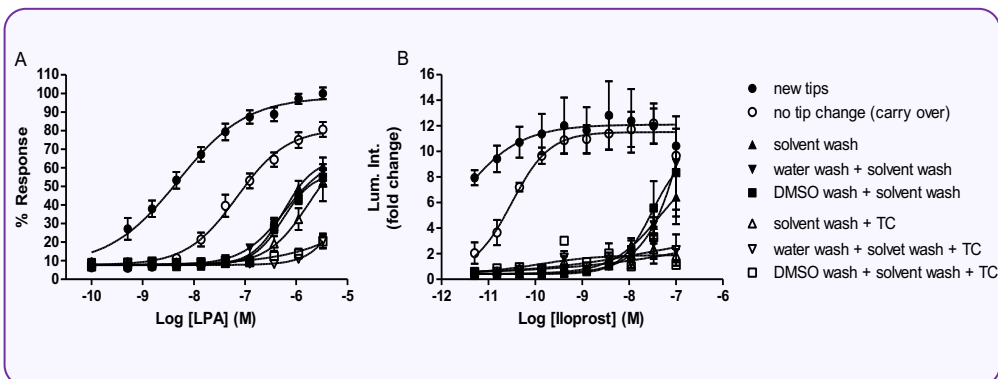
### LPA $\text{Ca}^{2+}$ flux assay

Chem-1 hLPA1 cells (Millipore) were cultured in DMEM, supplemented and harvested when 70 % confluent using trypsin/EDTA. The cells were plated into 384 well FLIPR plates at 12000 cells/well. Following overnight incubation the media was replaced with 20  $\mu\text{L}$  loading buffer, cells were loaded for 1 hour with a  $\text{Ca}^{2+}$  no wash dye (Molecular Devices, CA, USA) and incubated at 37 °C in 5%  $\text{CO}_2$ . To determine the level of agonist activity remaining after washing, 5  $\mu\text{L}$  of LPA at an  $\text{EC}_{80}$  concentration of 20 nM was added online using a Hamamatsu FDSS7000.

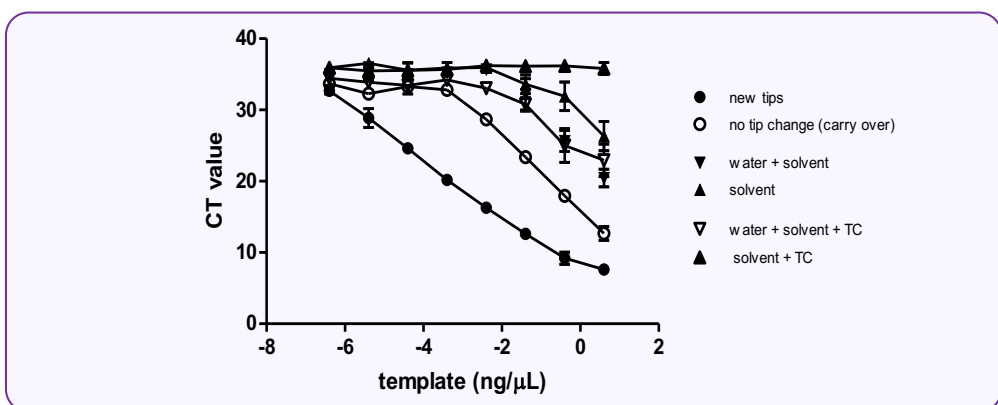
### cAMP glow sensor (IPR) assay

HEK293 cells were stably co-transfected with the human prostacyclin receptor (PTGIR) and the GloSensor™ (GS) cAMP biosensor to generate HEK-PTGIR-GS cells. Kinetic analysis of cAMP accumulation in cells expressing the IP receptor was conducted on re-suspended frozen cells in 10 mL of growth medium containing fetal bovine serum (10 % v/v) and 5  $\mu\text{M}$  rolipram. GloSensor™ reagent (4 % v/v) was added to cell suspension, and cells were seeded in 384-well black, clear bottomed plates at 20,000 cells/well, and incubated at room temperature for 2 hours in the dark. Cells were then stimulated with PTGIR ligands for 15 min and agonist responses were measured on a Hamamatsu FDSS7000 in luminescent mode.

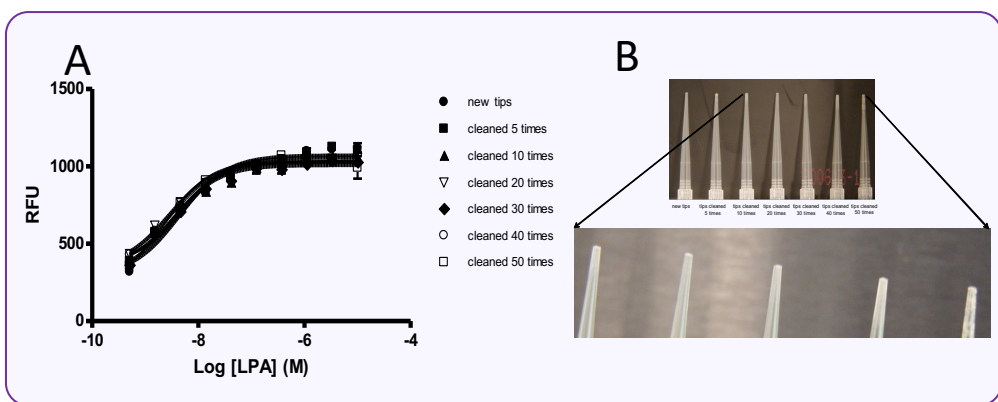
## Results



**Figure 1:** Determination of agonist carry over in  $\text{Ca}^{2+}$  release assay (A) and PTGIR cAMP GloSensor assay (B)



**Figure 2:** Determination of carry over for DNA as determined by PCR analysis



**Figure 3:** Variation in  $\text{EC}_{50}$  of LPA curves (A) and images of tip integrity (B) following repeated tip cleaning cycles.

Disposable 384 well tips were repeatedly exposed to increasing cycles of cold plasma before preparing a working concentration of LPA  $\text{EC}_{50}$  curves. Photographic evidence of tip damage after each exposure cycle to cold plasma was made. Tips may be cleaned up to 50x without detrimental effects on assay quality

## Conclusions

We have demonstrated that using the PureTIP LHC® to clean tips in combination with small volumes of solvent was more effective at removing contaminants such as compounds and DNA from disposable tips than by cleaning the tips in solvents and/or aqueous solutions alone. The disposable tips can be re-used at least 50 times without detriment to data quality. We estimate this technology will generate an 80-90% disposable tip cost saving and a reduction in disposal of over one ton of plastic waste to the environment over the course of the year.

## References

Ulrich Kogelschatz (2003) Dielectric-barrier Discharges: Their History, Discharge Physics, and Industrial Applications. *Plasma Chemistry and Plasma Processing*, Vol. 23, No. 1