TLC-AccuTOF DART

10ème anniversaire du Club de CCM
23/10/2008

Akihiko KUSAI, JEOL (Europe) SAS

AccuTOF DART

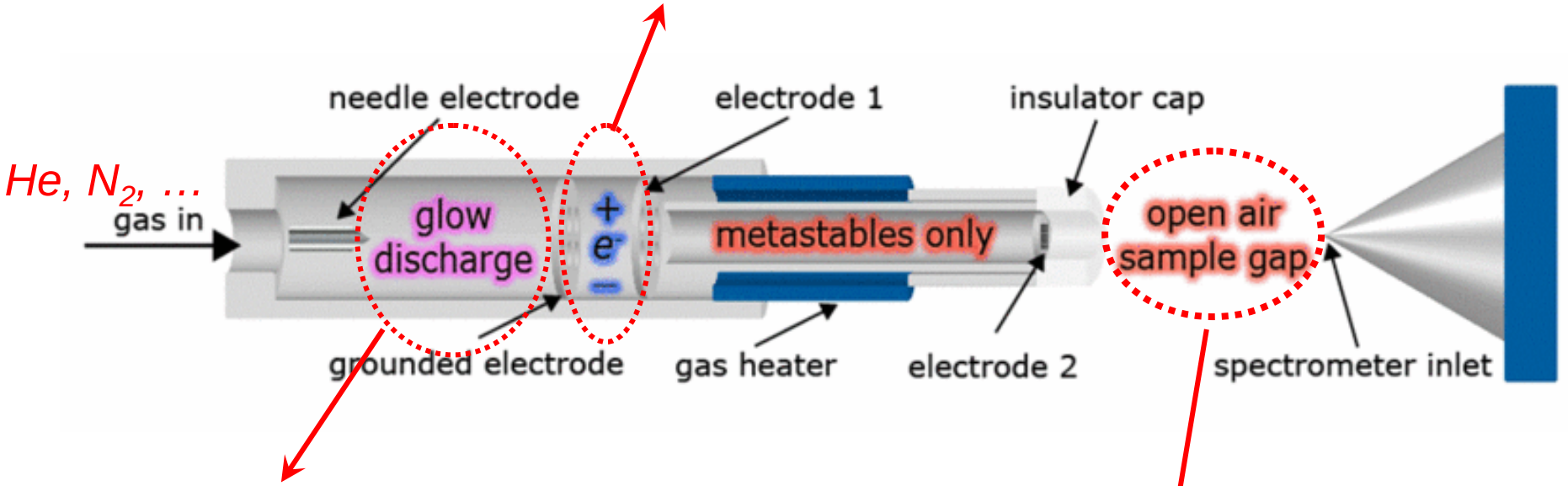
- Unless marked otherwise, DART is interfaced to a JEOL AccuTOF^{tm} time-of-flight mass spectrometer
- High resolution and exact mass measurements provide selectivity
- High dynamic range makes it easy to measure mixtures
- Exact masses and accurate isotopic abundances permit identification of unknowns
- Fast data acquisition for high throughput
- Mass-independent abundance response (small molecules)

What is DART?

- *DART is a rapid and non-contact surface sampling technique for mass spectrometry at atmospheric pressure under ambient conditions. (Ambient ionization technique)*
- *DART can be used to analyze any compounds; gases, liquids, solids and materials on surfaces.*
- *DART is suitable to analyze small-molecule compounds (with some exceptions).*
  - *Analyte mast be vaporized in the gas phase.*

DART Review

Electrodes block the charged particles and electrons.



Electron, charged molecules, and energetic atoms or gas molecule are formed by glow discharge.

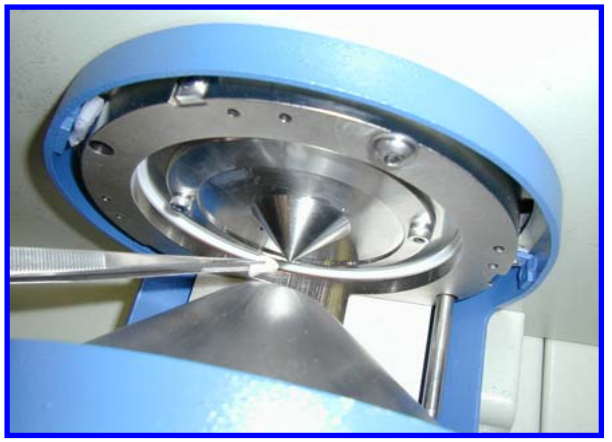
Compounds in gas phase are Ionized by metastables

Features of DART

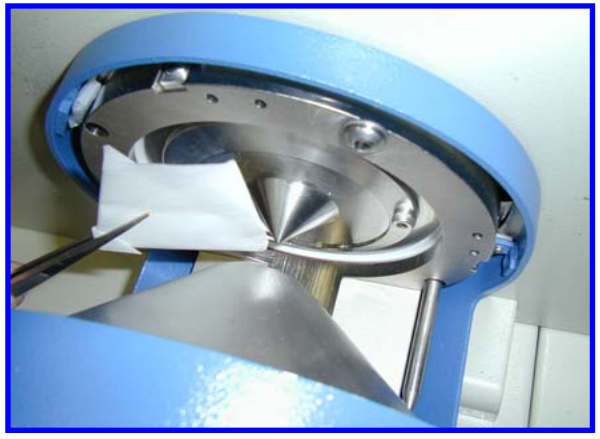
- Analysis time is very quick: analysis completes in seconds.
  - TOFMS is suitable for DART due to fast data sampling
- DART operation is very simple.
  - Open-air operation
  - No vacuum, No solvent, No carryover
- DART is not susceptible to high levels of salts
- DART is applicable to any compounds in gas phase
  - Gases, liquids, solids and ,materials on surfaces
- DART spectrum is very simple like a APCI spectrum
  - No alkali-metal adducts or multiple charges

Sample introduction

With a glass rod for liquid sample

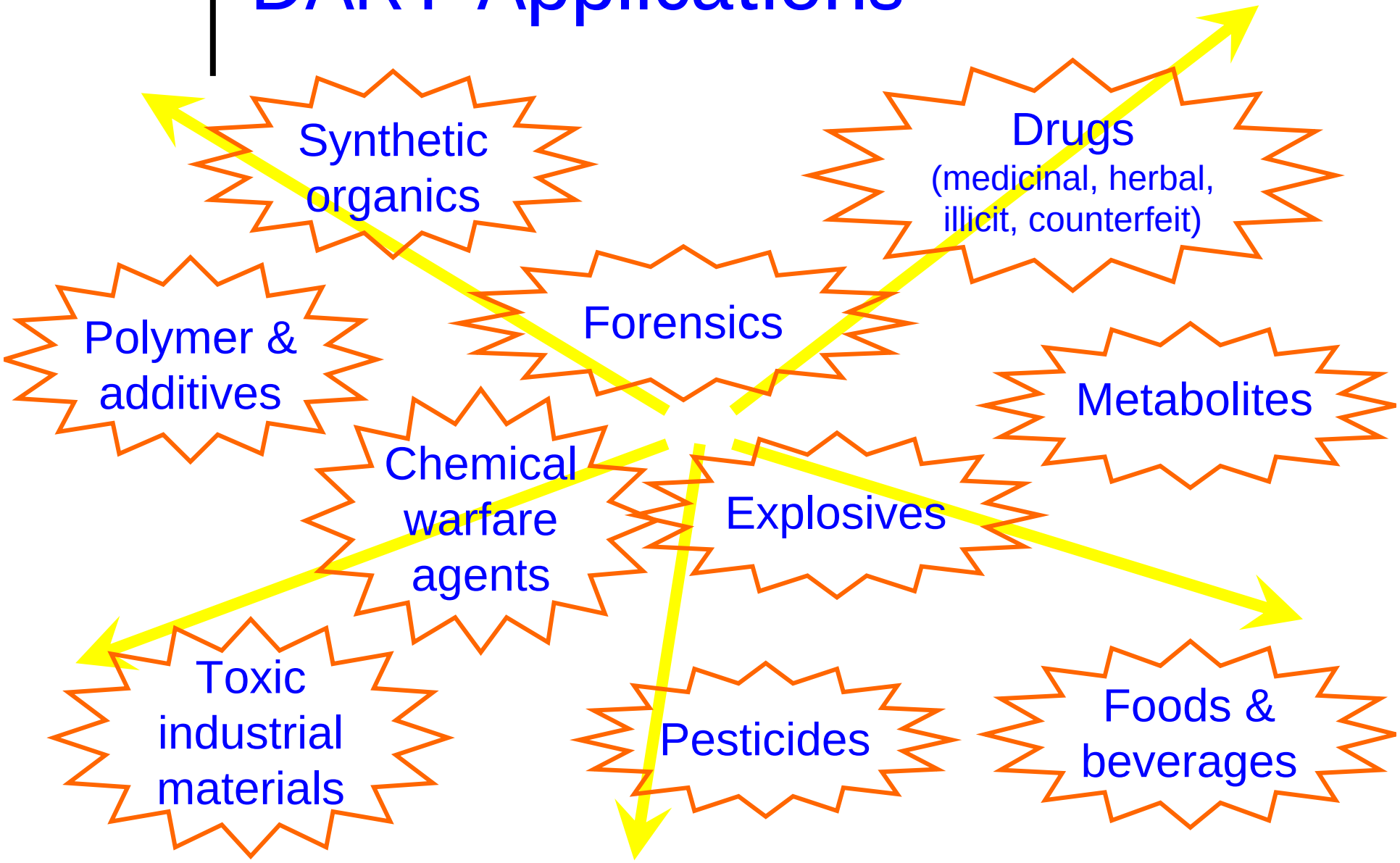


With tweezers for solid sample

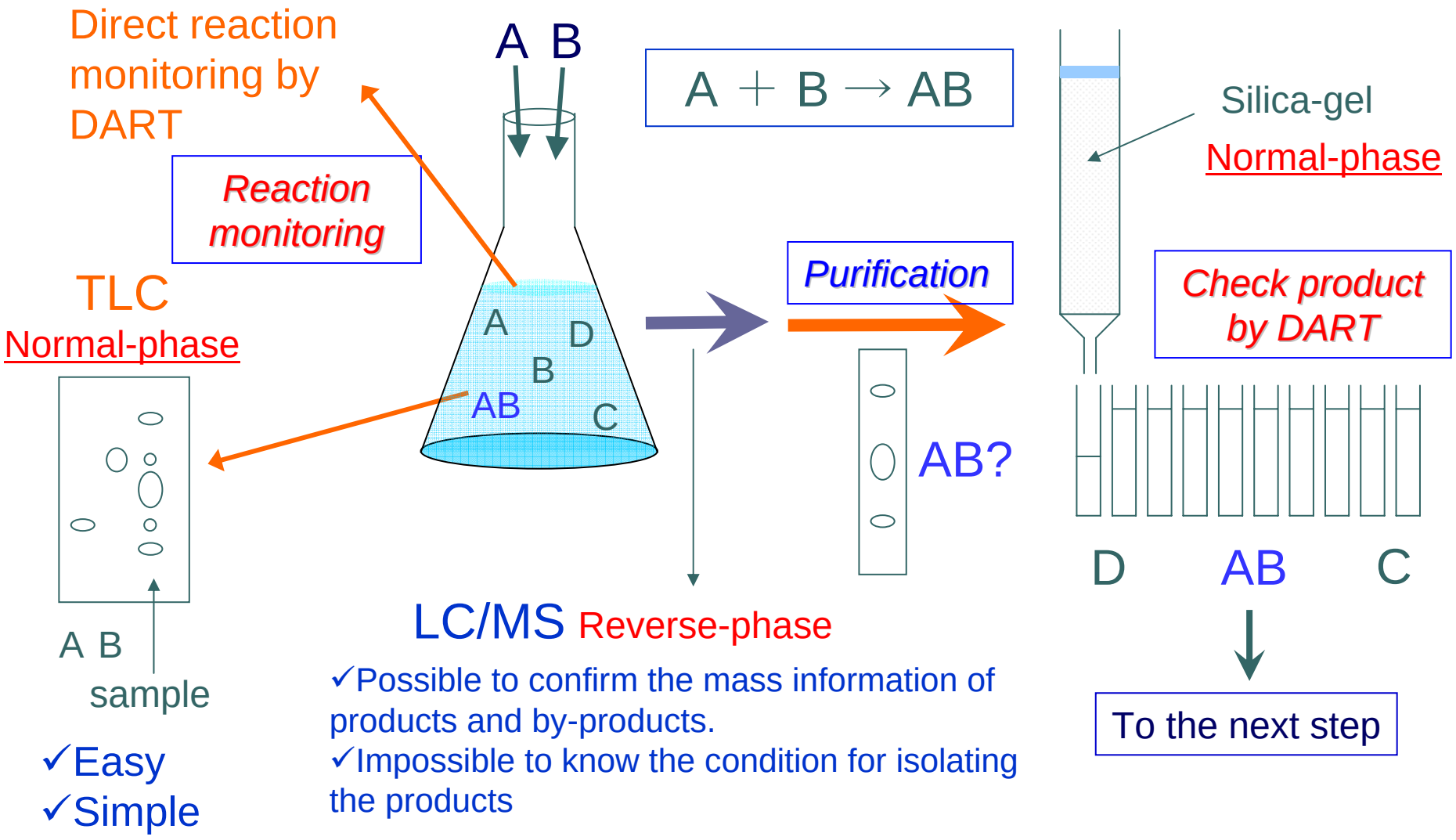


With a weighting paper for powder sample, not solved sample, etc.

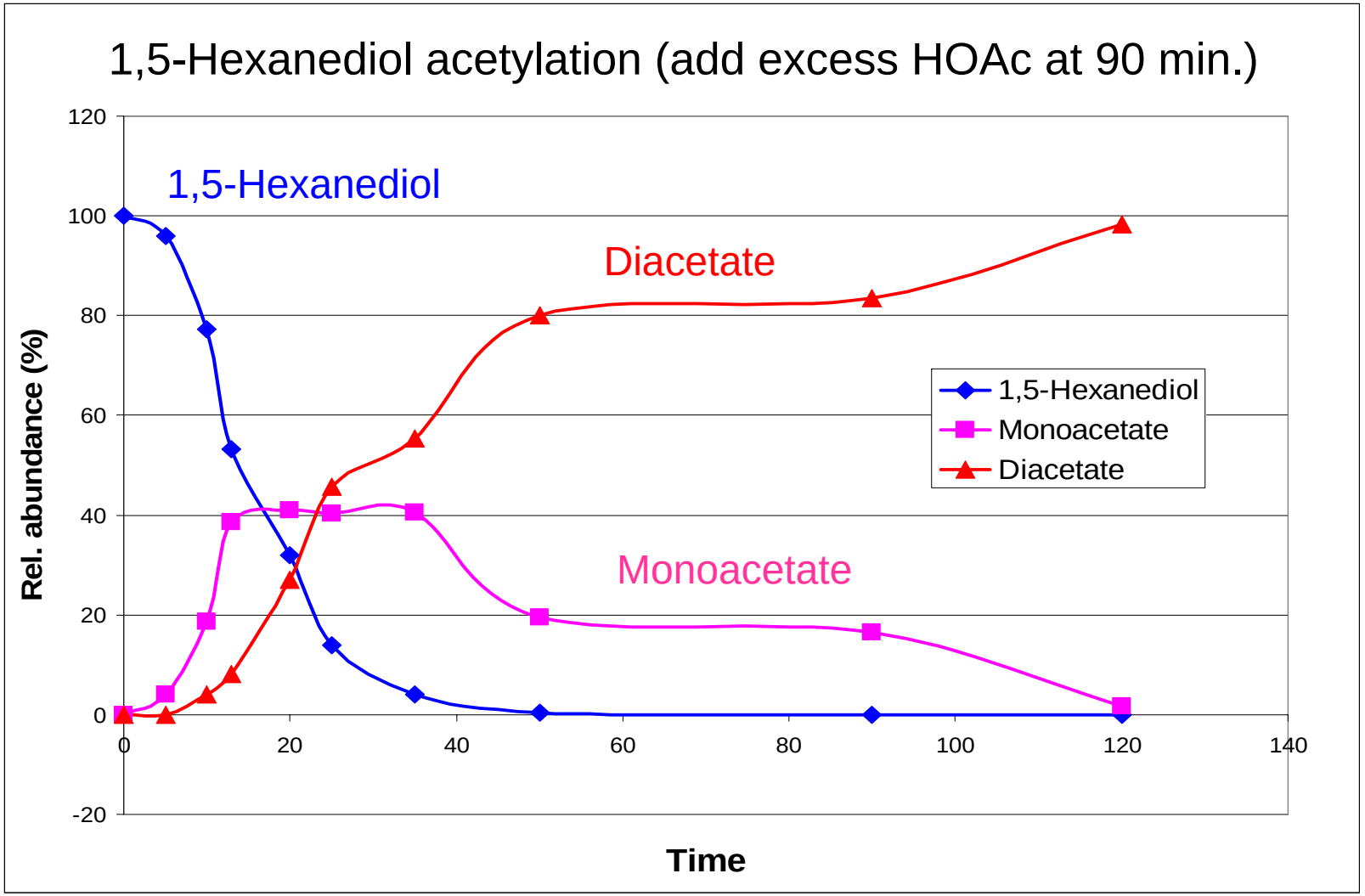
DART Applications



How DART can be used in the synthetic organics



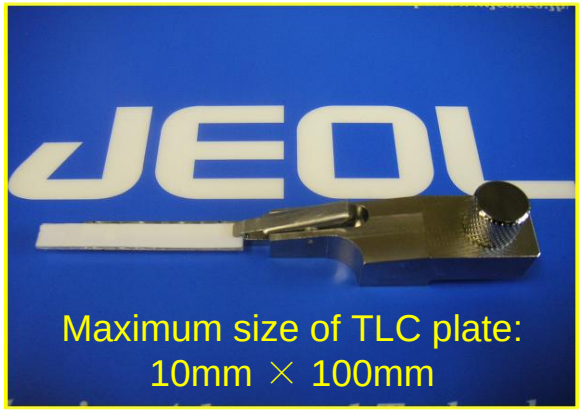
Direct reaction monitoring

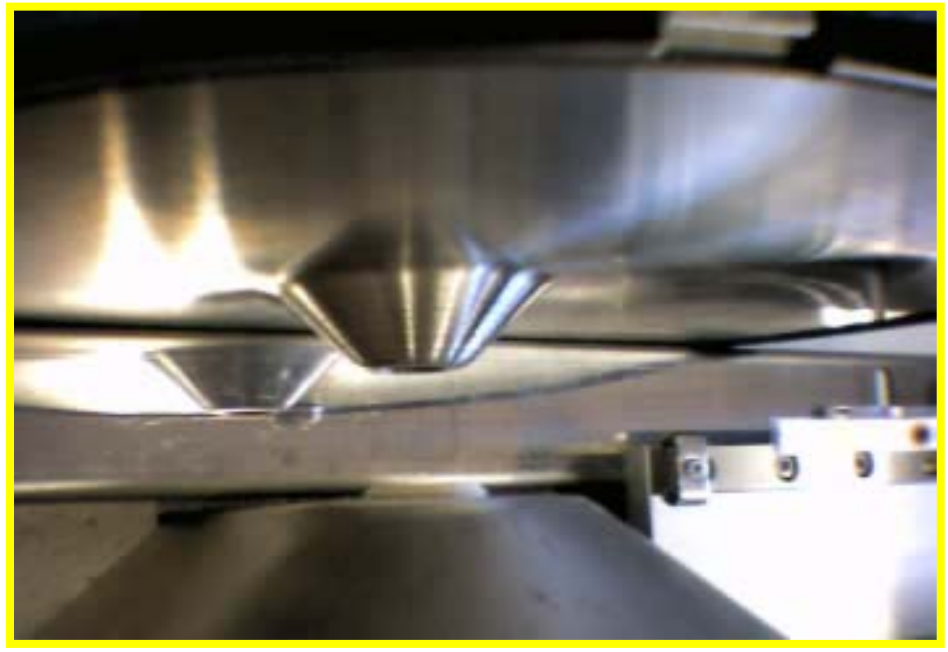


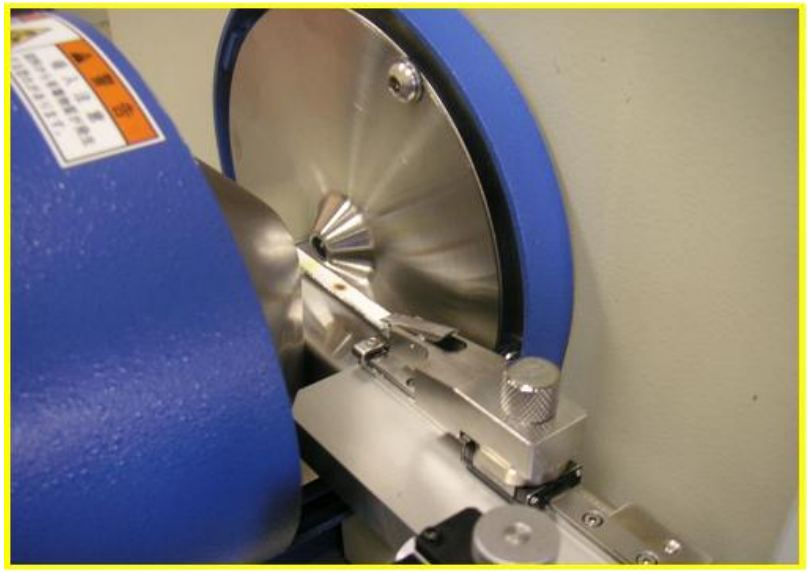
Published application by TLC-DART

- Molrock, Gertrud and Ueda, Yoshihisa. New coupling of planar chromatography with direct analysis in real time mass spectrometry. *Jounal of chromatography A*, 1143, **2007**, 243-251
- Natalle J. Smith, Marek A Domin, and Lawrence T. Scott, HRMS Directly From TLC Slides. A Powerful Tool for Rapid Analysis of Organic Mixtures, *Organic Letters*, **2008**, Vol.10, No.16, 3493-3496.

TLC sampler

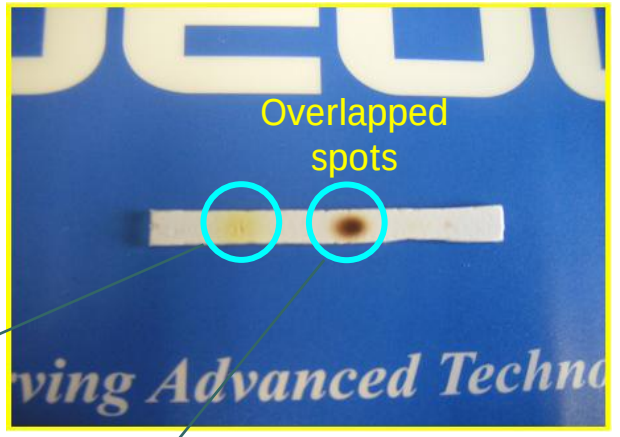


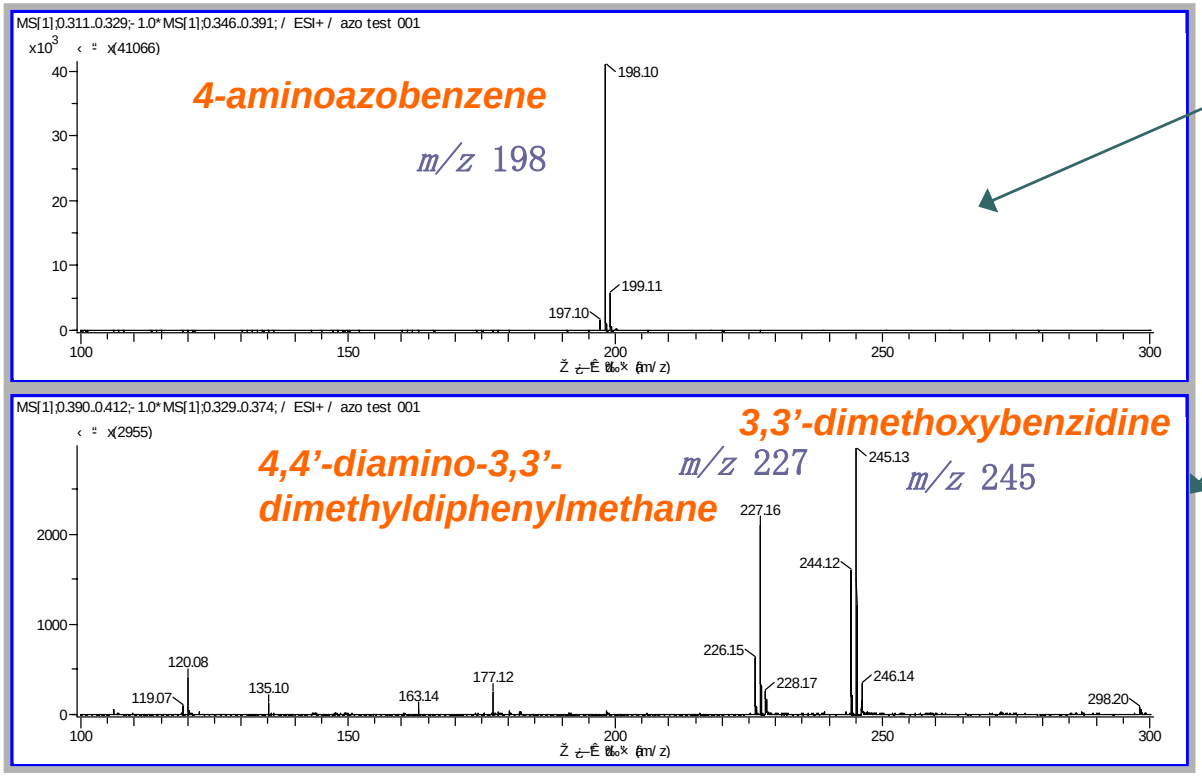




TLC plate sampler

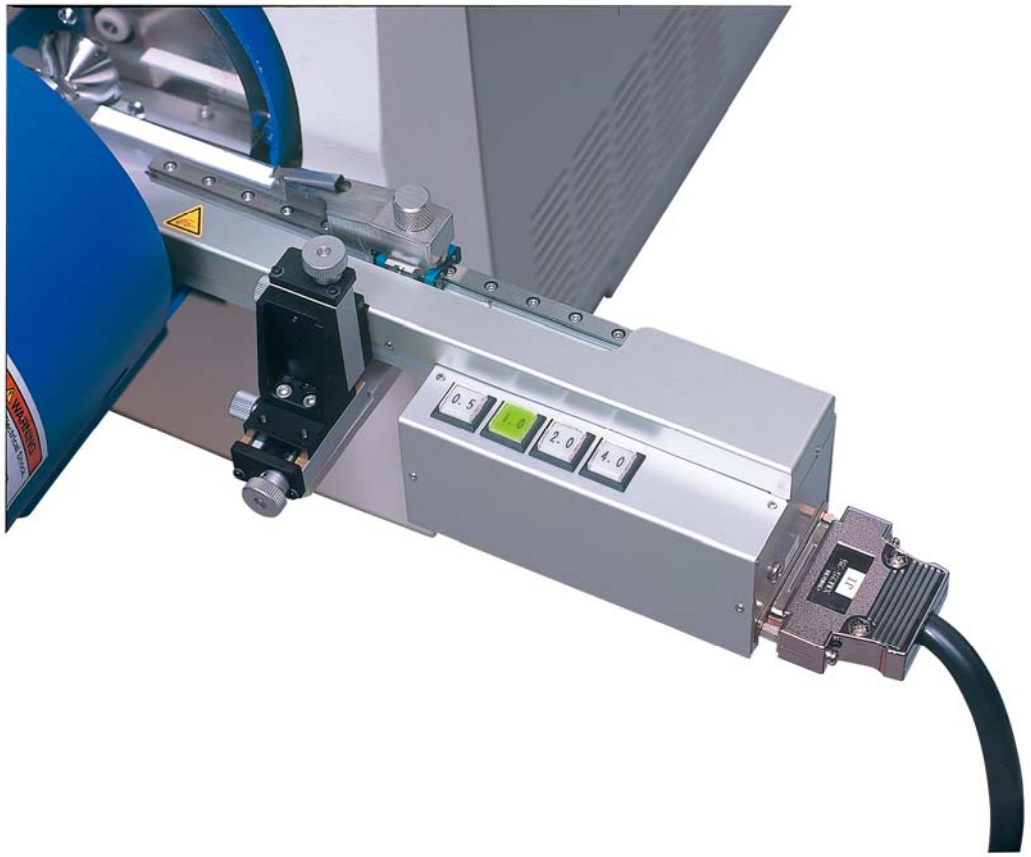
Analysis of azo compounds by TLC/DART



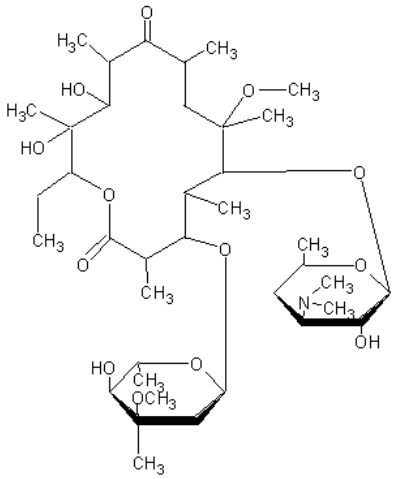


Feature of TLC Auto-Slider

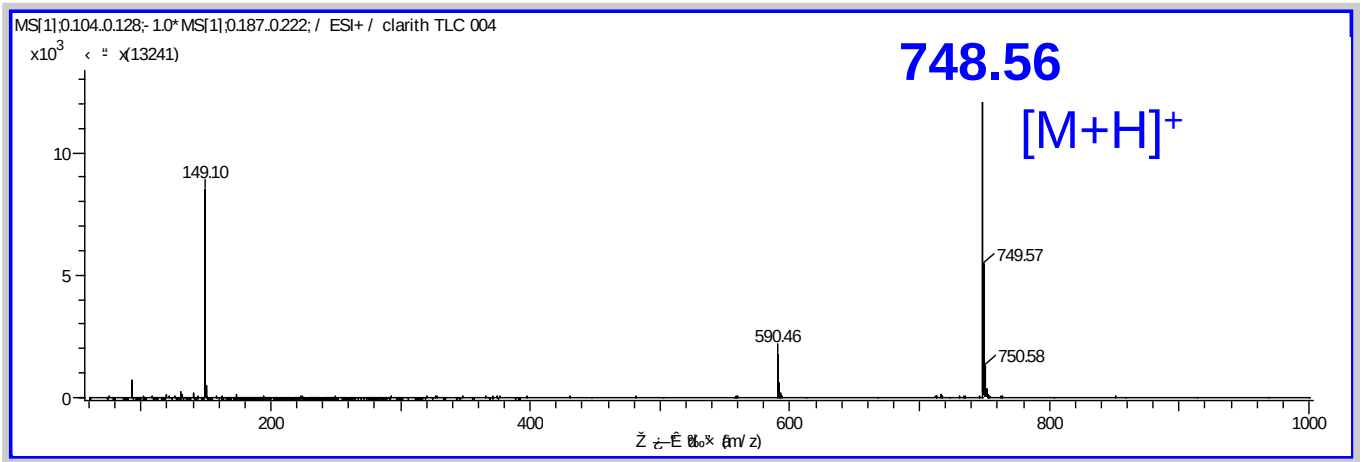
- Constant speed driving
- Controllable of driving speed
  (0.5, 1.0, 2.0 and 4.0 mm/sec)
- Good reproducibility
- Improvement of making a chromatogram
- Available to obtain Rf value

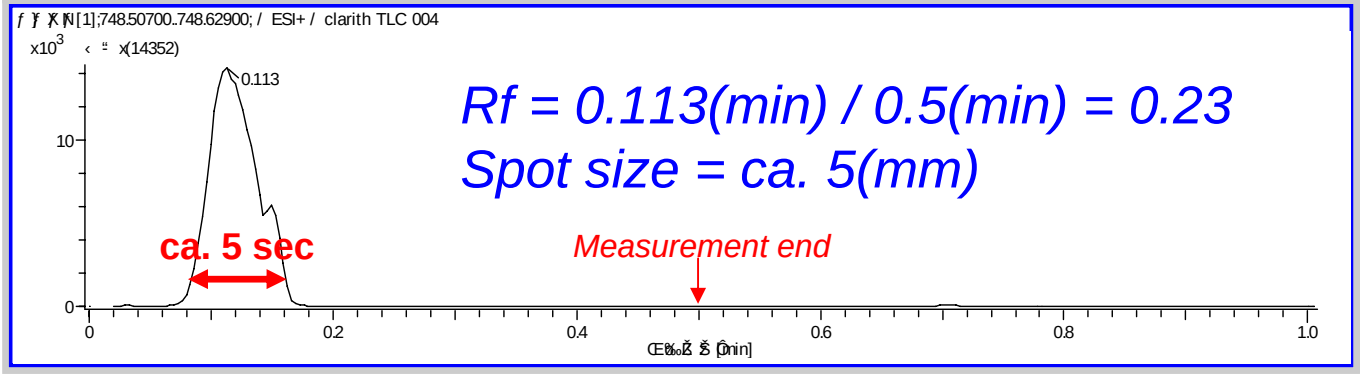


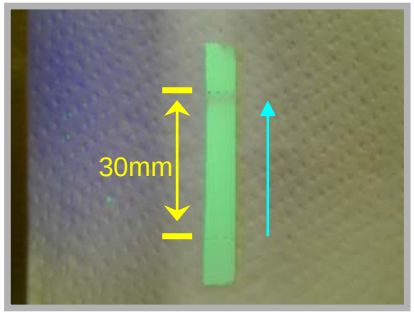
Analysis of macrolide antibiotics extracted by $CHCl_3$



Clarithromycin
($C_{38}H_{69}NO_{13}$)







$CHCl_3/CH_3OH$=9/1

Sliding speed : 1.0 mm/sec

<JMS-T100TD>

Conclusion

- *DART analysis is fast, easy and “no sample prep” (most of the time…)*
- *Simple mass spectra is obtained by DART. It is easy to make a interpretation.*
- *TLC/MS is the useful tools for high-throughput identification in the synthetic organics.*