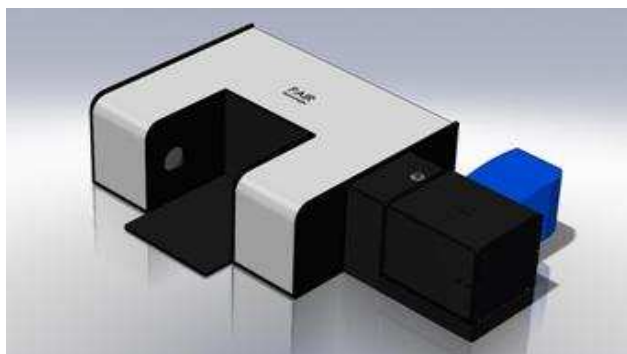


## The PAIR Journal

Volume 1, Issue 4  
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# PA-IR Marches On!!!



We've received the new manufactured components and have a assembled a "production quality" instrument.

This unit will be available for in-house demos, application

studies as well as shows and exhibits.

The availability of this new unit gave us the opportunity to install some upgraded components for mirror mounts and for grating mounts. These new components

will ensure that mirror positions do not change as sample compartment movement or vibration occur. This makes it even easier to remove or install an accessory sample compartment suitable for a specific application.

The grating mount makes it much easier to change gratings to cover different wavelength ranges or change spectral resolution as desired.

Gratings are blazed for maximum efficiency at

*(Continued on page 4)*

### Special points of interest:

- PA-IR Marches On!!!
- TECP Grant!
- Planar Array at Work
- Water Vapor Removal using the Double Beam

## PAIR RECEIVES TCEP GRANT!!

Pair Technologies, LLC has received a special grant from the National Science Foundation (NSF) that will allow us to partner with a commercial company to develop an

application specific analyzer, using planar array technology.

While we can't be very specific about the company or the application, we can say that we plan to take advantage of Pla-

nar Array's ability to select a specific wavelength range and operate at relatively high resolution in that range to separate 2 components whose spectral

*(Continued on page 4)*

# PLANAR ARRAY AT WORK

Recently, we had a request to analyze a series of samples comparing both an FT-IR and the Planar Array.

Both instruments were set up using the manufacturer's instructions.

The samples were liquids and were analyzed using the BioTools™ transmission cells with an optical path of 5.3  $\mu\text{m}$ .

The samples were analyzed in the Pair 100 using a wavelength range of 1800–3200  $\text{cm}^{-1}$  at approximately 8  $\text{cm}^{-1}$  spectral resolution. 200 scans were co-added as well as 40 rows. Total time for collecting the spectra from each sample was about 4 seconds.

The same cell was used for each sample with the cell being washed with a suitable solvent and dried between samples.

Data was saved and converted to GRAMS™ for further analysis.

The FT-IR was allowed to stabilize for a minimum of 12 hours prior to use. No purge was employed as the FT-IR owner was

™ Items noted are trademarked by their respective manufacturers.

working to reduce operating costs.

Because no purge was employed, a background spectrum was collected prior to each sample spectrum.

Once filled, the cell was inserted into the sample compartment and conditions inside the sample compartment were allowed to stabilize for 1 minute prior to collecting a scan.

“...Would saving about an hour a day be useful to you?...”

Each sample was scanned for a total of 64 scans or an elapsed time of approximately 2 minutes at a spectral resolution of 8  $\text{cm}^{-1}$ . Note that this observation time is about 40X that of the Planar Array.

So, how'd we do?

In comparing the results, we found NO DIFFERENCES! In both cases, the water bands dominated the spectra. Signal-to-noise ratios as measured by expanding the low absorbance portions of the spectra had about the same values, near 40 mA.

These data are consistent with

other data collected over the past year. In general, we get the same results as an FT-IR, but with a lot less observation time.

An interesting note is that running the 10 samples with the Planar Array system took about 2 hours while running the same sample set on the FT-IR took about 3 hours. Since filling and cleaning the cell between samples took the same amount of time, two factors account for the time difference.

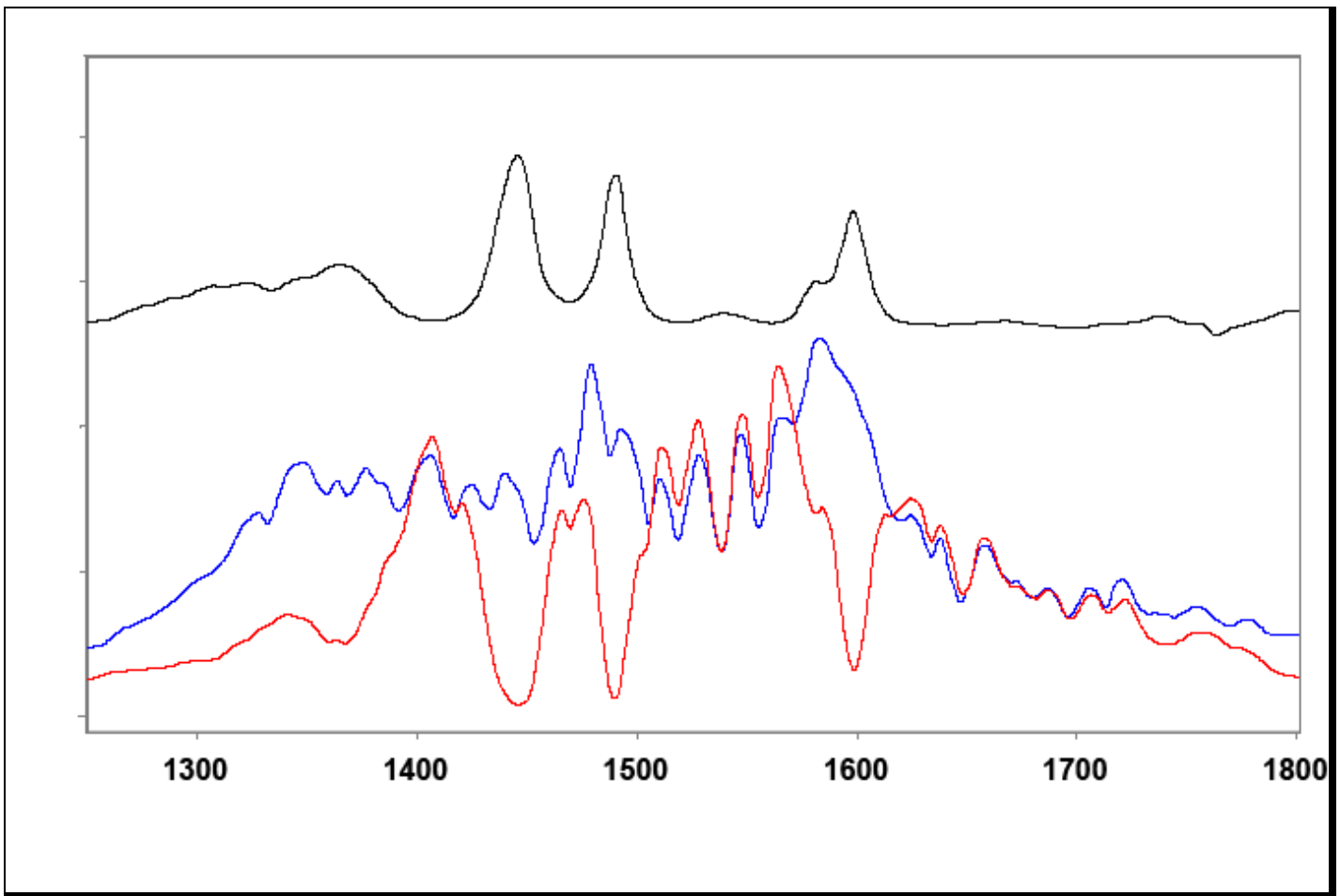
First, because the scan time for the Planar Array is about 50X faster than the FT-IR, naturally the Planar Array scan time takes less time to achieve results.

Second, because the FT-IR (and the Planar Array) was not purged, it was necessary to take a reference scan on the FT-IR before each sample scan. This effectively doubled the scan time per sample.

Another minor factor is the need to allow some time to stabilize the atmosphere in the sample compartment of the FT-IR. Although located in a lab with atmosphere control, the FT-IR operators informed us that re-establishing the purge in the sample compartment takes about a minute after inserting a sample. So, we waited a minute after installing a sample before collecting the spectrum.

Would saving about an hour a day be useful to you?

# WATER VAPOR REMOVAL WITHOUT PAIN!



We've been claiming that the double beam system can eliminate atmospheric interferences. To prove this, we recently ran a simple test using a polystyrene sample.

The image above shows three spectra.

On the bottom, the red spectrum shows a single beam spectrum of polystyrene with atmospheric humidity in the optical path.

The blue spectrum is a single

beam spectrum of only the atmospheric water vapor.

The black spectrum on the top is the same polystyrene sample run using the Double Beam sampling accessory. The water vapor is GONE!!!

A word of caution; just like an older style FT-IR, if the interfering molecule is present in large amounts, its absorbance will be very high at some frequencies. In those cases, whether using a Planar Array or an FT-IR, the signal to noise will be very poor.

So, while the Double Beam reduces or eliminates the need for purging, care should still be taken to reduce the presence of interfering molecules. This won't be a problem in a normal lab atmosphere, but we don't want to create the impression that you can use the Double Beam in a steam bath without considering water vapor!

To view our Applications or Technical Notes, please visit our website: [www.pairtech.com](http://www.pairtech.com)

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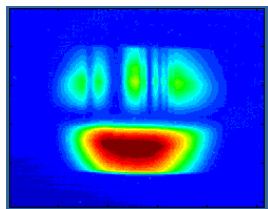
*Where Photons and Samples Meet and Exchange Information.*

Pair Technologies is a limited liability company (LLC) founded in July 2005 to research and design, manufacture, and market a mid-infrared analytical instruments that employs planar array detector technology.

The technique was developed and patented at the University of Delaware, which remains involved to this day.

Visit us at:

[www.pairtech.com](http://www.pairtech.com)



## WANT TO SEE HOW PLANAR ARRAY CAN SOLVE YOUR ANALYTICAL PROBLEMS?

Investing in analytical instruments is difficult in the current economic climate. To justify new technology, it is necessary to build an "air-tight" case for management.

You not only need to show that you can gain new information, you must also show a real, measurable benefit to your organization.

To help you, Pair Technologies, LLC has developed a program to make

your life easier.

First, we will gladly arrange to run samples or undertake investigations to show the data obtained with PA-IR and your samples. We can either host you at our facilities, or come to yours to collect the data. All data collected is treated as YOUR CONFIDENTIAL DATA—and you will retain all raw and processed files.

We have experienced staff who have

## PA-IR Marches On!!! *(cont'd)*

specific wavelengths, so it is usually advisable to change a grating when the detector is changed.

This is just one aspect of our program of continuous improvement in Planar Array instrumentation.

*(Continued from page 1)*

features overlap significantly.

Further complicating the application is the fact that one component is present at several hundred times the concentration of the other—and the measurement must be made in an industrial environment.

Finally, we need to monitor the concentration of both components simultaneously. Those of you doing chemometric equations on mixtures know how much fun (!) that can be.

If we're successful, this will not only add to analysts' capability of detecting and measuring multiple components, it will also result in a process application of planar array. So, the exciting times continue....

successfully written economic justifications for Management. We will work with you, under non-disclosure agreements if needed, to develop your presentation.

Our services are available at no charge, regardless of outcome.

Money is tight, but with the right arguments, you can join the forefront of infrared spectroscopy.