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## Nucleosides, Nucleotides and Nucleic Acids

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## Geniom® Technology—The Benchtop Array Facility

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## Geniom<sup>®</sup> Technology—The Benchtop Array Facility

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### ABSTRACT

Febit AG develops an integrated benchtop instrument for in situ microarrays preparation, hybridization, readout and data analysis.

*Key Words:* Microarray; In situ synthesis; Oligonucleotide; Gene expression profiling; Genotyping; Single nucleotide polymorphism (SNP); Resequencing.

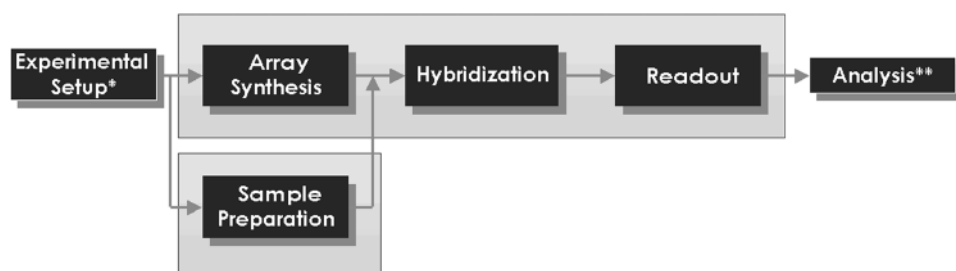
With an increasing amount of sequence data available in public databases and more than 500 ongoing sequencing projects, biological research has entered a new era. Researchers can easily access to complete genome sequences of more than hundred model organisms. This fact allows the design of an almost infinite number of complex experiments like gene expression profiling, resequencing or SNP's detection. New flexible tools are needed to ensure that these experiments can always be adapted to the rapid growing sequence information.

In contrast to the available array-technologies, febit ag has developed an integrated microarray platform that enables any researcher to design and perform his

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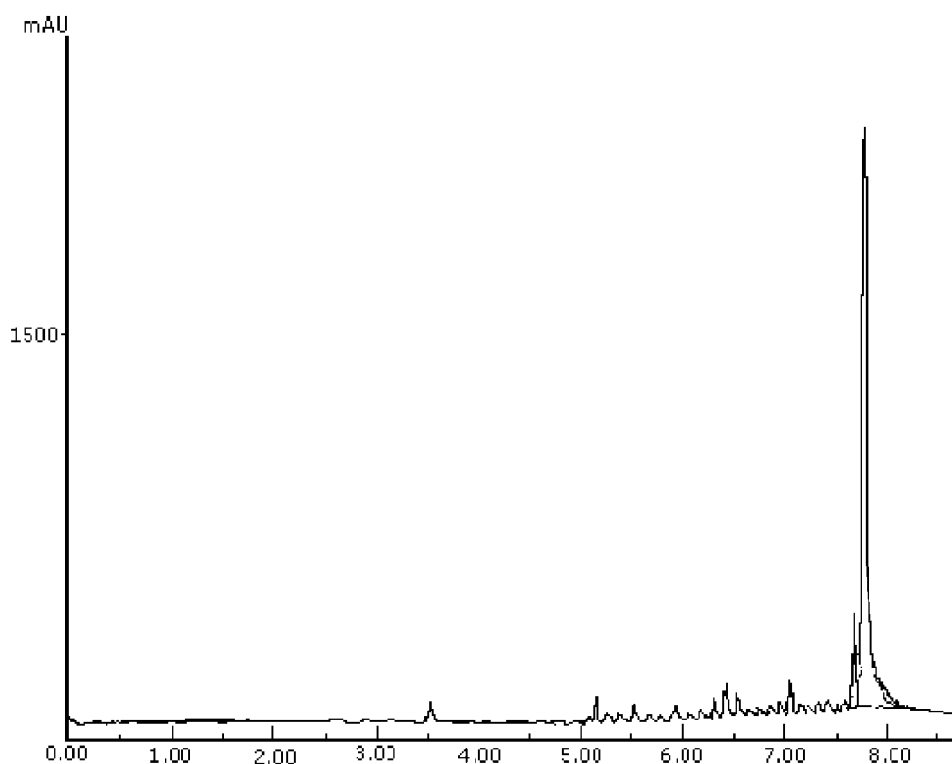




**Figure 1.** Workflow using the Geniom Oner technology: a single benchtop instrument integrates the complete process of synthesis, addition of the labelled probe, hybridisation and readout.

personalized microarray experiment. The microarray synthesis as well as hybridization, readout and data analysis take place in a single benchtop instrument, placed in the user's lab. This setup gives maximum flexibility in design and realization of all types of oligonucleotide based microarrays. (Fig. 1)

The reaction carrier, the so called DNA-Processor<sup>TM</sup>, is a microstructure which consists of three layers (glass-silicon-glass). The oligonucleotide synthesis takes place



**Figure 2.** CE-analysis of a 30-mer oligonucleotide, synthesized in a DNA-Processor employing geniom technology.

simultaneously in up to eight three-dimensional channels (arrays) (Fig. 2). During the hybridization each of those channels can be addressed individually. Therefore, the system offers the possibility to perform up to eight different experiments.

In addition, the Geniom<sup>®</sup> system is able to synthesize oligonucleotides not only in the conventional 3'→5', but also in the reverse 5'→3' direction. This approach expands the use of the Geniom<sup>®</sup> technology to experiments with enzymes that require free 3'-end.

The Geniom<sup>®</sup> system facilitates truly custom designed experiments improving quality and applicability of array experiments. The speed of probe optimization maximizes research results. Since the instrument uses the in situ synthesis of oligonucleotides, probe length may be different even within one array to consider differences in melting points and assure for best stringency.

The Geniom<sup>®</sup> system has demonstrated to be useful for a broad range of applications including gene expression profiling, genotyping of single nucleotide polymorphism (SNPs) and resequencing. This flexibility makes it an unmissable tool in any genomics laboratory.

Febit has started a broad initiative to make a wide variety of organisms available for expression profiling studies on the Geniom<sup>®</sup> platform. So far, complete sets for *S. cerevisiae*, *E. coli*, *P. multocida* and *S. pneumoniae* are available. Current activities focus on establishing validated probe sets for human.



