



## PAC

### Process Analytical Chemistry - Data Acquisition and Data Processing

<b>Main location</b>	Linz (Upper Austria)
<b>Other locations</b>	Kundl (Tirol), Salzburg, Lenzing (Upper Austria), Krems (Lower Austria), Vienna
<b>Thematic field</b>	Gaining valid chemical information directly from the process streams of chemical and biochemical industry, inline and in real-time.

#### Success story summary

##### Process control without direct measurements – new methods for production of antibiotics

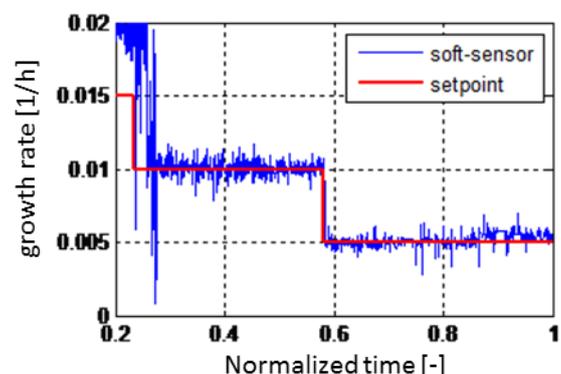
Similar to the era of Alexander Fleming, who was awarded the Nobel Prize for his discovery of penicillin, today, fungus cultivations are the primary means for antibiotic production. However, controlling the organism's biology on an industrial scale is a mighty challenge. The PAC consortium has developed a method, which by combining different measurements, is able to control the industrial production process, effectively predicting the biology without direct measurements of the organism. This method will be implemented in the production process, improving Austria's competitiveness in the global economy.

#### Success story

Penicillin, one of the most important antibiotics of our era, was discovered by Alexander Fleming, who received a Nobel Prize for this discovery in 1945. Today, the targeted production of penicillin is still performed via controlled cultivations of fungus in large bioreactors. Since for an optimal production, the fungus must be steered through different process phases, execution of this process is a complex task. Subsequent phases exhibit an effect on each other, so that a small deviation at the beginning of the process can result in large variations of product yield.

This PAC subproject, led by the Bioprocess Technology Research Group at the Vienna University of Technology and in close collaboration with SCCH, has developed a method for simplifying and improving the robustness of the aforementioned complex process control tasks. This method is not dependent on direct measurements of the fungus itself, which is often time consuming and laborious, but relies on combination of more readily-available measurements. By employing verified mechanistic mathematical models, the non-measured biological or physiological variables of interest can be measured robustly, making them available for process control strategies.

Moreover, the developed method provides the advantage, that deviations in previous process phases can be compensated using the provided control possibilities. Therefore, constant high product yields and quality can be achieved repeatedly.



#### Impact and effects

This method is being adopted by the industrial partner for implementation in the penicillin production process. This will ensure the efficiency of the production process for such an important product, in addition to strengthening the position of Austria's industrial competitiveness.

Moreover, a generically applicable solution for improving the production processes of other products, in areas such as biopharmaceuticals or biorefinery, has been found.

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