

New Institute of Chemistry and Biotechnology ICB at ZHW

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Abstract: The recently founded Institute of Chemistry and Biotechnology ICB of the Zurich University of Applied Sciences, Winterthur, (ZHW) is the common platform for all R&D as well as service activities of the *Abteilung für Chemie und Biologische Chemie CBC*. The geographical market of the ICB comprises primarily the Greater Zurich Area, eastern and central Switzerland. The customers are the small- and medium-sized enterprises of the region as well as larger corporations in Switzerland. The ICB benefits from its two pillars, chemistry and biotechnology, and a sound networking of the institute at ZHW and in Switzerland. The structure of the ICB is clearly centered around three focal points of competence, namely Specialty Chemistry, (Bio)Chemical Measurement and Sensor Technique, and Chemical and Biochemical Engineering.

Keywords: Institute of Chemistry and Biotechnology · Zurich University of Applied Sciences ZHW

1. Goals and Strategy

Background

The chemical and pharmaceutical industry in Switzerland employed some 64'000 persons in approximately 1000 companies in the year 2001 [1]. The ratio of employees is *ca.* 55 to 45 in chemical and pharmaceutical enterprises, respectively.

Almost two thirds of these employees work in large-, one third in small- or medium-sized enterprises (SME). The area of northwestern Switzerland hosts more than half of all employees due to the traditionally established large-scale chemistry located

in and around Basel. However, the Greater Zurich Area, central and eastern Switzerland employ 14'600 people, almost a quarter, who work predominantly in SMEs.

Goals

The ICB is the common platform for all R&D and service activities of the *Abteilung für Chemie und Biologische Chemie CBC*. The ICB also fulfills the complete performance description as outlined in the mission for universities of applied sciences. In the following, we focus upon R&D and services only.

The ICB is geographically focused on the Greater Zurich Area, central and eastern Switzerland and, hence, on SMEs – partner oriented. However, projects are also operated with partners all over Switzerland. They may be linked, for instance, with ETHZ or associated research and service centers.

The ICB concentrates, for the period 2004–2006, on the following targets in order to continue the successful presence on the market:

- The ICB offers high quality R&D to industry and society. A major responsibility of the ICB is the efficient transfer between the needs of industry, particularly of SMEs, and the ba-

sic sciences of universities and research centers.

- The ICB strategically concentrates its R&D activities on the three focal points of competence: Specialty Chemistry, (Bio) Chemical Measurement and Sensor Technique, and Chemical and Biochemical Engineering.
- The R&D share is aimed at 30% of the total turnover of the CBC by 2006 and shall, in a few more years, grow to between 40 and 50% (the remainder is substantiated by the curriculum).

2. Research and Development, Services

In the ICB, teams of professors, scientists, technicians and assistants work in projects in one of the three focal points of competence:

- *(Bio)Chemical Measurement and Sensor Technique* is active in the following areas:

Development, optimization, and validation of
– (bio)analytical and chemometric measurement systems and methods,

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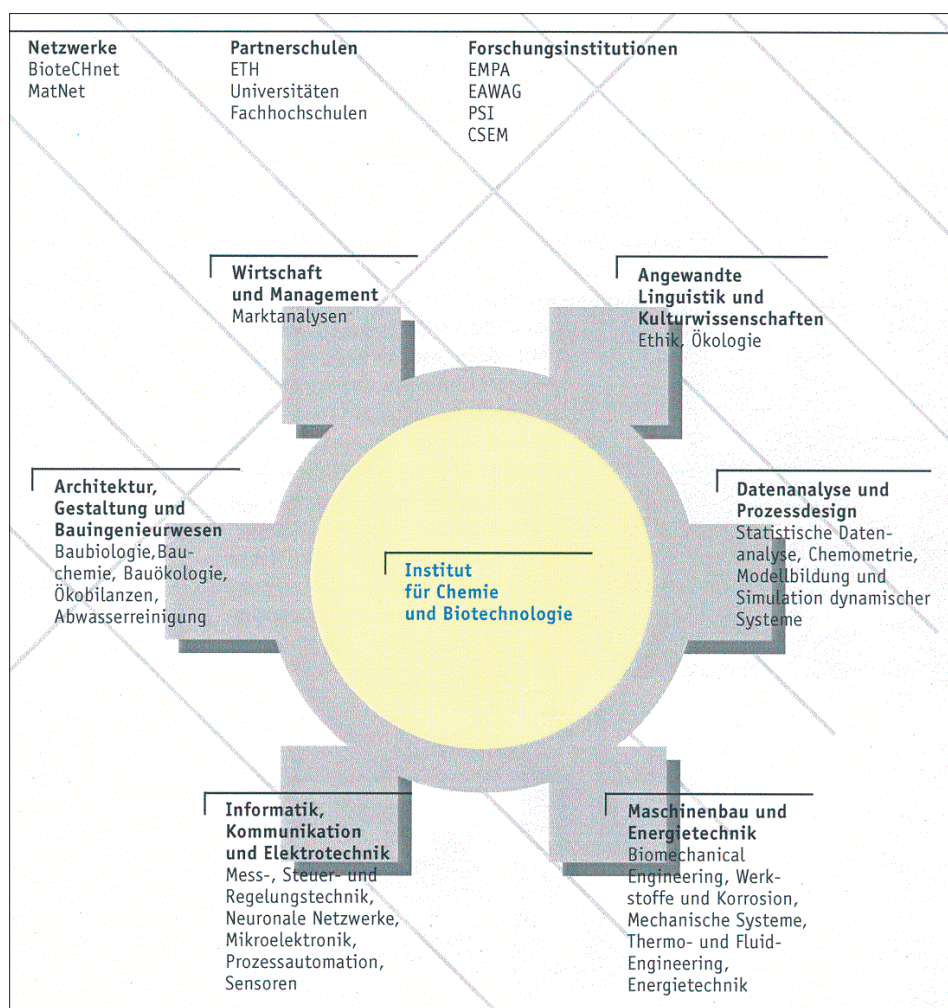


Fig. 1. The focal points of competence cooperate with each other, are linked with other R&D institutions of the ZHW and further universities, and are embedded in national networks

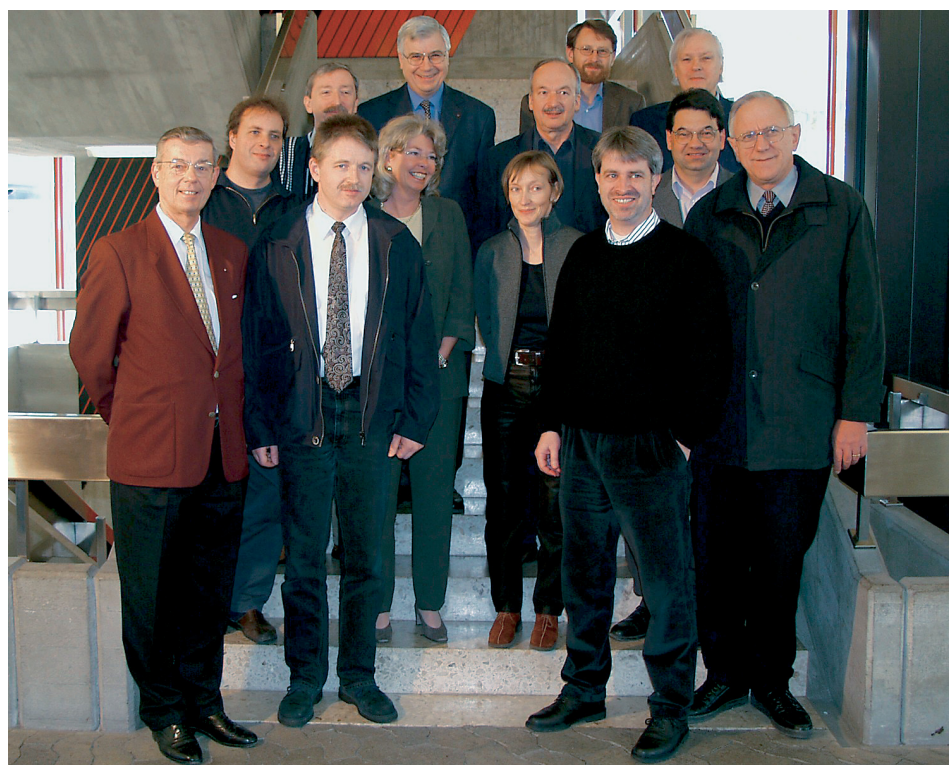


Fig. 2. Professors at the ICB

– chemical sensors, biosensors, and assays.

• **Chemical and Biochemical Engineering** prioritizes the following:

- chemical and biochemical process technology,
- down stream processing and analysis of biochemical materials,
- cell culture technology: microbes, higher cells, and tissues.

• **Specialty Chemistry** underpins the following:

- development and optimization of synthesis methods for pharmaceuticals, diagnostics, and polymers,
- application-driven modification of polymer materials (polymer blends),
- modification and characterization of surfaces (micro and nano technology).

Common to all three is that they apply analytical techniques and, for that goal, specialized methods and equipment. The industrial partners can benefit from this infrastructure and the respective specialized know-how through service contracts (Fig. 1).

3. The Market of ICB: Customers

Many SMEs in the greater economic area around Winterthur are active in or connected with chemistry or pharmaceuticals. Alone in the canton of Zurich are 4200 people employed by the chemical industry.

The situation in the field of biotechnology is quite similar. Besides large companies based in the Basel area, some 70 SMEs reside in the Greater Zurich Area and in eastern Switzerland, covering a great variety of biotech activities (producers of goods, equipment, entire plants, services, and research institutes).

This defines the geographic market of the ICB though, in particular cases, the field for cooperations includes other parts of Switzerland and the close neighbor countries, especially the lake Constance region.

Industrial customers are primarily those SMEs that need access to specific competences or infrastructure of the ICB. They are not exclusively from the chemistry or biotech branch. The ICB also benefits from the outsourcing strategies of large companies, be this for scientific, personal or financial reasons.

Major impacts on the acquisition of R&D projects are: Our size, backed by the number of students, permits the maintenance of a broad spectrum of activities and competences. The ICB offers more than one discipline, namely chemistry and biotechnology. The ZHW itself, with some 2500 students, is a multidisciplinary university within which the ICB has access to the re-

Table. Synopsis of the laboratories in the ICB

Laboratory	Head of laboratory
Inorganic & Environmental Chemistry	R. Francke
Analytical Chemistry	E. Gamp
Physical Chemistry & Measurement Techniques	A. Amrein
Industrial Chemistry & Polymer Technology	M. Hirayama
Organic Chemistry	U. Michel
Chemical & Environmental Engineering	T. Spielmann
Biochemical Engineering	B. Sonnleitner
Biochemistry	C. Zaborosch
Micro & Cell Biology	U. Graf

sources of other departments and institutes, for instance for covering technical or economic aspects.

4. Organization and Infrastructure

The ICB benefits from a lean management structure. It is organized in various laboratories with common and specialized equipment (Table). R&D as well as services

are conducted in these laboratories in tight collaboration by professors, scientists, assistants and technicians, in total equivalent to more than 15 full time positions (Fig. 2). All laboratories contribute to the three focal points of competence which give the ICB a clear market position.

We are very eager to live according to the proven concept 'unity of teaching and research'. We strengthen the transfer of R&D into teaching not only by properly

choosing the topics for student projects and diploma theses, the transfer also takes place in specialized subjects offered to advanced classes.

The ICB has currently a laboratory infrastructure (without immobile installations) in the order of 14 mio CHF investment volume. A considerable fraction has been financed *via* R&D-projects and, with a few exceptions, this equipment is exploited for R&D, teaching and services.

5. Outlook

The R&D income of the ICB was roughly 3 mio CHF in 2003 and is aimed at reaching approximately 4 mio CHF by 2006. This shall be achieved by expanding the research staff. New professors shall help to extend existing expertise, open new fields and promote interface activities, *e.g.* nano sciences and bioanalytics.

The multidisciplinary character of the university as well as size and networking of the ICB provide a sound basis for its successful proliferation.

Received: March 3, 2004

[1] Statistical data from Swiss Federal Statistical Office, Bundesamt für Statistik BFS.