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Swiss Science Concentrates

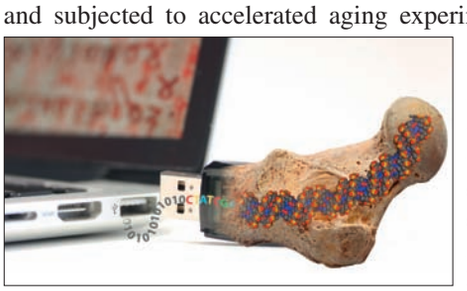
A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

Robust Chemical Preservation of Digital Information on DNA in Silica with Error-Correcting Codes

R. N. Grass*, R. Heckel, M. Puddu, D. Paunescu, and W. J. Stark, *Angew. Chem. Int. Ed.* **2015**, *54*, 2552. ETH Zürich

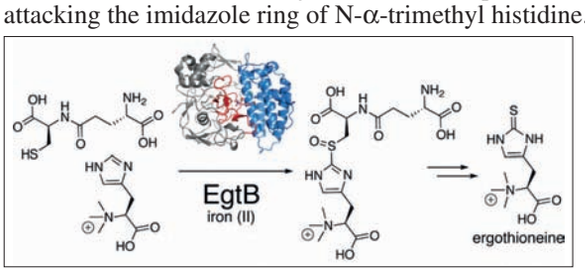
The conservation of digital information for extended time frames is challenging and cannot be guaranteed by traditional optical and magnetic storage technologies. DNA has been proposed as a potential medium for long-term data storage but several limitations, especially in terms of desiccated DNA preservation and error handling, exist. Grass, Stark and coworkers now showed that digital information can be recovered from DNA after encapsulation in an inorganic matrix and by employing error-correcting codes. Thus, the *Swiss Federal Charter from 1291* and the *Method of Archimedes* (83 kB of information) were translated into 4991 158-mers of DNA. The DNA was encapsulated in silica and subjected to accelerated aging experiments. The original information could be recovered error free after keeping the DNA at 70 °C for one week, conditions that are equivalent to storage in central Europe for 2000 years.



Structure of the Sulfoxide Synthase EgtB from the Ergothioneine Biosynthetic Pathway

K. V. Goncharenko, A. Vit, W. Blankenfeldt*, and F. P. Seebeck*, *Angew. Chem. Int. Ed.* **2015**, *54*, 2821. University of Basel

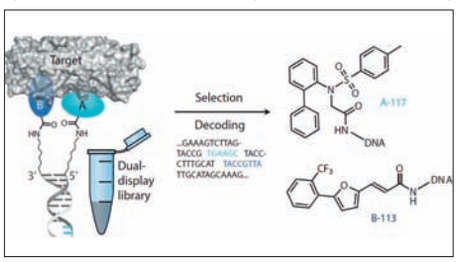
Ergothioneine occurs in a broad range of prokaryotic and eukaryotic organisms, including humans and human pathogens such as *Mycobacterium tuberculosis*. The precise cellular function of ergothioneine is not known, but recent observations suggest that this sulfur compound may be a protectant against oxidative stress. To elucidate the structural basis for sulfoxide synthase activity, Seebeck, Blankenfeldt and coworkers have endeavoured and successfully achieved the crystal structure of EgtB from *Mycobacterium thermoresistibile* in complex with γ-glutamyl cysteine and N-α-trimethyl histidine. The study reveals that the two substrates and three histidine residues serve as ligands in an octahedral iron binding site. This active site geometry is consistent with a catalytic mechanism in which C–S bond formation is initiated by an iron(III)-complexed thiyl radical attacking the imidazole ring of N-α-trimethyl histidine.



Dual-display of Small Molecules Enables the Discovery of Ligand Pairs and Facilitates Affinity Maturation

M. Wichert, N. Krall, W. Decurtins, R. M. Franzini, F. Pretto, P. Schneider, D. Neri*, and J. Scheuermann*, *Nat. Chem.* **2015**, *7*, 241. ETH Zürich

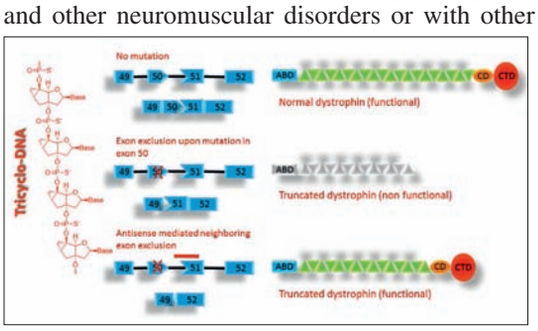
Dual-display DNA-encoded chemical libraries allow the identification of fragment pairs that bind simultaneously to a biological target molecule. However, the technology has been limited by difficulties in the decoding process. Scheuermann, Neri and coworkers now report a strategy that overcomes this limitation. Small organic molecules were conjugated to complementary DNA strands that contain a unique identifying code. DNA hybridization followed by an inter-strand code-transfer created a DNA-encoded chemical library of 111,100 members (see illustration; with permission, NPG). Using this approach, a low micromolar binder to alpha-1-acid glycoprotein and a ligand to carbonic anhydrase IX has been identified, which dramatically improved tumour targeting performance *in vivo*.



Functional Correction in Mouse Models of Muscular Dystrophy Using Exon-skipping Tricyclo-DNA Oligomers

A. Goyenvalle, G. Griffith, A. Babbs, S. El Andaloussi, K. Ezzat, A. Avril, B. Dugovic, R. Chaussenot, A. Ferry, T. Voit, H. Amthor, C. Bühr, S. Schürch, M. J. A. Wood, K. E. Davies, C. Vaillend, C. Leumann*, and L. Garcia*, *Nat. Med.* **2015**, *21*, 270. University of Bern

Systemic use of antisense oligonucleotides (AONs) is limited due to poor tissue uptake. Garcia, Leumann and collaborators present a new class of AONs made of tricyclo-DNA (tcDNA), which displays unique pharmacological properties and unprecedented uptake by many tissues after systemic administration. Improved properties were demonstrated in mouse models of Duchenne muscular dystrophy (DMD), a neurogenetic disease in the dystrophin gene. The findings render tcDNA-AON chemistry particularly attractive as a potential future therapy for patients with DMD and other neuromuscular disorders or with other diseases that are eligible for exon-skipping approaches requiring whole-body treatment.



Prepared by Caroline D. Bösch, Markus Probst, Yuliia Vyborna, Mykhailo Vybornyi, Simon M. Langenegger and Robert Häner

Do you want your article to appear in the SWISS SCIENCE CONCENTRATES highlight?

Please contact robert.haener@dcb.unibe.ch

SCG Schweizerische Chemische Gesellschaft | SSC Société Suisse de Chimie | SCS Swiss Chemical Society

www.scg.ch

Society News and Announcements

Dear CHIMIA readers,

On behalf of the KGF (Contact Group for Research Matters) it's my privilege to announce the prizewinners of the KGF-SCS Industrial Science Awards 2015. Together with the Swiss Chemical Society the KGF member companies honor outstanding achievements of industrial scientists working in Switzerland.

For more than 40 years KGF, a Swiss Industry Association, is supporting the promotion of scientific excellence and understanding in Switzerland and nearby regions.

In the name of the KGF I would like to congratulate all prizewinners for their outstanding scientific contributions.

Dr. Reto Naef
KGF chair
Novartis Pharma AG

Prof. E. Peter Kündig
President
Swiss Chemical Society

KontaktGruppe für Forschungsfragen
Contact Group for Research Matters

BASF The Chemical Company · NOVARTIS · Roche · syngenta

Award Ceremonies and Award Lectures

The award ceremonies will take place on the occasion of the SCS Fall Meeting Dinner in Lausanne on September 3, 2015. We are proud to announce the award lectures either in the plenary session or in one of the parallel sessions of the Fall Meeting at EPF Lausanne on September 4, 2015.

Friday, September 4, 2015; SCS Fall Meeting Lausanne

– *Dr. Jürg Zimmermann*, Novartis Pharma AG
  Winner of the Distinguished Industrial Investigator Award 2015. Plenary Session, at 17.15 h
– *Dr. Michelangelo Scalone*, F. Hoffmann-La Roche AG
  Winner of the Senior Industrial Investigator Award 2015
  Plenary Lecture at 10.25 h
– *Dr. Dietmar Hüglin*, BASF Schweiz AG
  Winner of the Industrial Investigator Award 2015
  Invited lecture in the Session of Polymers, Colloids & Interfaces at 11.15 h

For details please visit the SCS Fall Meeting website on http://scg.ch/fallmeeting/2015

KGF-SCS Distinguished Industrial Science Award 2015
Certificate and reward of CHF 15'000

The award is given to
Dr. Jürg Zimmermann,
Novartis Pharma AG
for the ground breaking discovery of protein kinase inhibitors, which had a tremendous impact on the research and therapy of cancer and other diseases. The discovery and development of Imatinib (Gleevec) has revolutionized the therapy of certain forms of leukemia, and also had a tremendous impact on research projects both in industry and academia.

Professional career

1984–88	PhD Prof. Dieter Seebach, ETH Zurich,
1988/89	Post-doc with A. Beckwith, ANU, Australia
1989/90	Post-doc with R. Lown, Canada
1990–93	Medicinal chemist with Ciba-Geigy, Basel.
1993–98	Leader and deputy leader for several major research projects at Ciba and Novartis.
1998–2003	Head of Combinatorial Chemistry, CTA, Novartis Ltd., Basel
2003–06	Global Head of Lead Synthesis and Chemogenetics, Novartis
2007–11	Global Head of Oncology & Exploratory Chemistry
2010–11	a.i. Head of Global Discovery Chemistry
2011–	Global Head of Oncology, Infectious Disease & Exploratory Chemistry

Scientific experience/contribution

Jürg Zimmermann was the Medicinal Chemistry team leader working on the Bcr-Abl Inhibitor project. Jürg made pivotal contributions to the discovery and development of Imatinib, a pioneering oncology drug that established the field of targeted cancer therapeutics. The effort that led to the discovery and development of Gleevec emanated from basic research in the field of tumor oncogenes. The most validated oncogene drug target in the late 1980s, was the Bcr-Abl protein kinase, which had been convincingly shown to be the driver oncogene in Chronic Myeloid Leukemia (CML). Our translational research contribution to CML treatment built on basic research from multiple academic groups in the leukemia field, which established the scientific foundation for our work on blocking the enzyme activity of the defective Bcr-Abl oncogene. As with all drug discovery/development programs, the success of Imatinib is a testament to teamwork within a small focused team. Within our team, Jürg was responsible for medicinal chemistry. Jürg was the Medicinal Chemistry inventor of CGP57148, which subsequently became known as Imatinib (Gleevec or Glivec). Under Jürg's Medicinal Chemistry leadership, we were able to discover lead compounds from the 2-phenylamino pyrimidine class in early 1990. Jürg and his chemistry team then optimized these early non-selective protein kinase inhibitors to arrive at CGP 57148, a highly selective and potent inhibitor of Bcr-Abl.

This achievement in targeted therapy revolutionized the world of cancer drug discovery. Imatinib specifically targets a cancer-causing driver mutation found in all cases of Ph-chromosome positive CML. Rather than aiming at rapidly proliferating cells and provoking toxic side effects as prior chemotherapeutic agents did, Jürg Zimmermann and his chemistry team optimized compounds for high selectivity against the Bcr-Abl oncogene that drives CML – a tactic that most scientists predicted would fail. In addition to work on inhibitors of the Bcr-Abl kinase, Jürg Zimmermann also led medicinal chemistry on two additional projects during his early career at Novartis. These projects included: CDK inhibitors and Staurosporin-based protein kinase inhibitors. In 2003, following his success with Imatinib, Jürg became Global Head of Lead Synthesis and Chemogenetics at Novartis. In this position, he was intimately involved in directing the medicinal chemistry effort that has made Novartis a leader in the field of oncology-targeted therapies. In addition to project-focused chemistry, Jürg was also responsible for integrating chemical genetics and library synthesis (in solution and on solid phase) into the discovery process. One of his most important contributions during this time was the integration of screening small-molecule libraries for compounds that induce a phenotype of interest, or forward chemical genetics, into Novartis's drug target identification process. Based on his achievements, Jürg Zimmermann was promoted to Global Head of Oncology & Exploratory Chemistry and subsequently a.i. Global Head of Discovery Chemistry at Novartis. During Jürg's tenure as Leader of Oncology Chemistry, he was accountable for all aspects of chemistry strategy on projects, including exploratory and parallel chemistry, lead development and lead optimization work and clinical candidate delivery. Jürg successfully oversaw the promotion of multiple programs (>20) into clinical development. These clinical candidates include compounds with a variety of mechanisms of action, including enzymes inhibitors, protein–protein interactions inhibitors and receptors antagonists.

Dr. Andreas Marzinzik (Director, Novartis Institutes for BioMedical Research)

KGF-SCS Senior Industrial Science Award 2015
Certificate and reward of CHF 10'000

The award is given to
Dr. Michelangelo Scalone,
F. Hoffmann La Roche,
for his outstanding contributions to the design of new, short and cost-efficient syntheses for many development projects by applying asymmetric catalytic reactions, and for his longtime success and expertise in leading the Center of Excellence Catalysis at Roche.

Professional career

1983	PhD at ETH Zurich, Prof. Piero Pino
since 1984	Scientist in the Catalysis & Process Research Group, F. Hoffmann-La Roche, Basel
1990/91	One year at Roche Nutley (USA) in the Process Research/Kilolab Area
today	Distinguished Scientist and Head of the Center of Excellence Metal Catalysis within the Process Research & Development Department of the Pharmaceuticals Division of F. Hoffmann-La Roche, Basel

Scientific experience/contribution

Originally an organometallic chemist, Michelangelo Scalone is a Process Research chemist with particular experience in homogeneous and heterogeneous catalytic reactions, especially asymmetric reactions (*e.g.* hydrogenations, carbonylations, cyclizations, cyclopropanations, metathesis *etc.*) and in the synthesis of chiral homogeneous catalysts. His task is, together with his team, to create short, efficient, reproducible, safe, ecological and economical syntheses with technical potential for new pharmaceutical development compounds.

Michelangelo supports the whole Roche group, bringing in his and his group's highly appreciated expertise in many Roche Basel, Shanghai and Genentech projects. He consistently and successfully developed and delivered practical and timely chemical solutions for numerous Roche development compounds, *e.g.* Mibefradil, Danoprevir, CETP 2, MAO-B Inhibitor 1 (Tempium) and 2 (Sembragiline), Insulin Sensitizer, Xenical (2nd gen. synthesis), Bitopertin, Aleglitazar, *etc.*

The strategic thinking and the introduction of breakthrough ideas into new, short and cost-efficient syntheses decrease the production time, save a lot of development work activities and generate cost-effective solutions for the company.

As an expert in the field of applied organometallic catalysis and process research, Michelangelo is very well-known also outside Roche within a very broad scientific community and is a very welcome speaker at international conferences.

Overall, Michelangelo's work has led to a very high number of efficient and well scalable processes for Roche's development compounds. His secret consists in being always open to new ideas, interacting and communicating clearly as well as listening attentively, the concrete application being always in focus. When doing presentations, Michelangelo is able to articulate his ideas in a very clear manner to a variety of audiences. He conveys a strong passion for science and often generates enthusiastic responses from the audience.

Dr. Pius Waldmeier, F. Hoffmann-La Roche Ltd.

KGF-SCS Industrial Investigator Award 2015
Certificate and reward of CHF 7'000

The award is given to
Dr. Dietmar Hüglin,
BASF Schweiz AG,
for his contribution in developing new ingredients for consumer product markets and specifically for the discovery, research & development of cosmetic UV absorbers combining chemistry with nano-technology. These innovations are setting currently the global standards in high performance UV protection of human skin.

Professional career

1989	PhD at University Freiburg i. Br., Germany, Prof. H. Zimmermann
1990	Research chemist in Ciba-Geigy's Agro-Division in Research & Development, Basel, Switzerland
1992	Research chemist in the Microelectronics Research Group of OCG, Providence, Rhode Island, USA
1994	Research chemist and research group leader in Ciba's Consumer Care Division
2001	Global Head of Research & Development of Segment Home & Personal Care within Ciba Specialty Chemicals
2008	Global Head of Research Center Protection and Stabilization within Ciba's newly formed corporate research unit
2009	Global Head of Research Stabilizers within BASF's Specialty Chemicals Research Division

2012 Vice President Performance Materials Research Basel within BASF's Advanced Materials & Systems Research Division
2014 Head of BASF Research Center Basel

Scientific experience/contribution

Since Dietmar joined Ciba-Geigy in 1990 he has worked most successfully on many different research projects in a variety of industrial applications – the first 5 years as lab chemist, followed by group leader positions with his own lab and since 2000 in different research management positions. His scientific successes have been recognized by various awards and promotions, culminating in the promotion to Vice President Research within BASF (Executive Expert) in 2012. Dietmar's work has resulted in an exceptionally large number of new products, particularly new ingredients for consumer markets like personal care, fabric care and home care. These products define new performance standards in their applications and significantly contribute to the success of BASF. The main scientific field over many years was in cosmetic UV protection. Since the start of the research project Dietmar has been an essential team member in the discovery and development of high performance UV absorbers for cosmetic applications, which today set the global standard for efficient UV protection of human skin, preventing chronic skin damage like photo-ageing and skin cancer (*e.g.* melanoma). Tinosorb S, the world's leading UVA+B broad spectrum absorber, widely used in both sunscreens and day care products, was discovered by Dietmar in his own lab. It is estimated that more than 2 billion units of consumer products containing this filter have been sold since its launch in 2002.

Besides cosmetic UV absorbers Dietmar's work has led to a remarkable number of new products, amongst others photo-polyimides for electronic applications (Probimide), ingredient stabilizers (Tinogard), cosmetic actives (Tinocare), optical brighteners (Tinopal), photocatalysts (Tinolux) and bleach catalysts for laundry detergents (Tinocat). His scientific work is documented in a high number of best quality patents and papers and he is regularly visible at international scientific conferences.

Dr. Andreas Hafner, BASF Schweiz AG

Prof. Christian Bochet is New President of DFR

E-mail: Christian.Bochet@unifr.ch
http://www.chem.unifr.ch/cb

Prof. Christian Bochet, University of Fribourg, took over the mandate as DFR's president from Prof. Philippe Renaud as of January 1, 2015. We would like to welcome Christian as DFR president and member of the SCS Board of Directors and wish him a successful term of office.

Christian Bochet was born in 1968 in Den Haag. After attending schools in Paris and Geneva, he started studying chemistry in 1987 at the University of Geneva. He obtained his diploma in 1991 in inorganic chemistry under the guidance of Prof. Alan Williams. He then joined the group of the late Prof. Wolfgang Oppolzer, and received a Ph.D. in organic chemistry in 1996, focusing on total synthesis of alkaloids. From 1996 to 1998, he was a postdoctoral associate at Stanford University with Prof. Barry M. Trost, where he worked on transition metal catalysis applied to the synthesis of natural products. In 1998, he returned to the University of Geneva as Maître-Assistant, where he set up an independent research group in organic photochemistry. In 2002, he was awarded an SNF-professorship by the Swiss National Science Foundation, and moved to the University of Fribourg, where he became full professor in 2006. His current interests include reagent-controlled selective reactions, total synthesis of natural products and organic photochemistry. When not doing chemistry, he enjoys playing violin in the Geneva Symphony Orchestra, reading and long-distance running.

The contest is on! Apply now to get a chance to win one of the three prizes!

With the EU Prize for Women Innovators, the European Commission wants to give public recognition to outstanding women entrepreneurs who brought their innovative ideas to the market. The aim is to inspire other women to follow in their footsteps.

After two successful editions in 2011 and 2014, the European Commission has launched the third edition of the prize.

Three prizes will be awarded in Spring 2016:
– 1st prize: € 100 000
– 2nd prize: € 50 000
– 3rd prize: € 30 000

Contestants will be able to submit their entries until 20 October 2015 (12.00 h – Brussels time).

An independent panel of judges from business and academia will select the three winners who will be announced in 2016.

Who can participate in the contest?

The contest is open to all women who have founded or co-founded their company and who have at some point of their careers benefitted from the EU's research framework programmes, the EURATOM Framework Programme, the Competitiveness and Innovation framework programme (CIP) or actions relating to research and innovation under the European Structural and Investment Funds (known as the Structural Funds prior to 2014).

The contestant must reside in an EU Member State or a country associated to Horizon 2020, the EU's research and innovation programme.

The company must have been registered before 1 January 2013 and have had an annual turnover of at least EUR 100 000 in 2013 or 2014.

How to apply?

You can apply in 6 easy steps *via* our web-based submission system. Go to *http://ec.europa.eu/research/innovation-union*

A warm welcome to our new members!

Period: 21.02.2015 – 27.03.2015

Jarred Blank, Saint-Louis (FR) - Ghyslain Budin, Saint Louis (FR)- Duy Anh Bui, Basel - Sandrine Cudré Correia de Almeida, Meyrin - John D'Alessandri, Claro - Pierre-Yves Dakas, Huningue (FR) - Üzeyir Dogan, Zürich - Guillaume Duret, Mulhouse (FR) - Luca Gobbi, Buus - Anita Orsolya Hidasi, Zürich - Urban Jenelten, Arzier - Jeremy Michel, Dinhard – Charlotte Petit, Genève - Josep Puigmarti-Luis, St Gallen - Ydna Questell, Crissier - Sarah Saint-Auret, Riedisheim - Johann Schmidt, Schöfflisdorf - Masoud Talebi Amiri, Lausanne - David Tilley, Zürich - Ernst Vogel, Disentis - Timothy Wells, Chambesy - Dajing Yuan, Genève - Yang Yue, Dübendorf.

SCS Division of Analytical Sciences

Weiterbildung Analytik

Trenntechnik
Analytische Anwendungen
Methoden der Life Sciences
Qualitätssicherung
InCompany Trainings

Titel	Ort	Termin	Code
Präparative Chromatographie	Freiburg	05.05.2015	TR-15
Kjedahl, Dumas und NIR – Grundlagen und Anwendungen der Stickstoff- und Proteinbestimmung	Flawil	08.05.2015	AA-9
Enantioselektive Trennmethoden	Dübendorf	13.05.2015	TR-14
Einführung in die Gaschromatographie (GC)	Schlieren	19.–20.05.2015	TR-4
Statistische Auswertung von Messwerten	Dübendorf	19.–21.05.2015	QS-3
Nah-Infrarot (NIR) Spektrometrie	Flawil	20.05.2015	SP-5
Statistical Design and Analysis of Experiments	Basel/Novartis	27.–29.05.2015	QS-4
Isolierung und Reinigung von Proteinen	Basel/Novartis	04.-05.06.2015	LS-3
Validieren von Analysenverfahren I	Dübendorf	09.06.2015	QS-8
Grundlagen der Probenvorbereitung	Dübendorf	16.06.2015	AA-8
Gute Labor Praxis - GLP	Dübendorf	22.06.2015	QS-11
Referenzmaterialien	Dübendorf	25.06.2015	QS-14
Validieren von Analysenverfahren II	Dübendorf	26.06.2015	QS-9
GMP-Praxis im Labor	Dübendorf	26.06.2015	QS-10
Chemische Sensoren im analytischen Einsatz	Dübendorf	29.06.2015	AA-3
Einführung in die HPLC	Dübendorf	24.–25.08.2015	TR-9
Interpretation von NMR-, IR-, und Massenspektren	Dübendorf	26.08.2015	SP-11
Pharmazeutischen Technologien	Wädenswil	01.–02.09.2015	LS-5
AAS und AES für Einsteiger/-innen	Dübendorf	02.09.2015	SP-1
AAS und AES - Theorie für die Praxis	Dübendorf	09.09.2015	SP-2
Messunsicherheit in der Analytik	Dübendorf	16.–17.09.2015	QS-5
Französisch			
Spectrométrie d'absorption atomique avec four graphite (AAS-GF) et Spectrométrie d'emission atomique à plasma inductif (ICP-OES)	Genève	05.05.2015	AA-1f
Echantillonnage ou prélèvement représentatif en production	Genève	06.05.2015	AA-4f
Préparation de l'échantillon liquide	Genève	08.05.2015	AA-2f
Analyse qualitative et quantitative en GC/MS	Genève	11.05.2015	MS-2f
Troubleshooting en GC/MS	Genève	12.05.2015	MS-3f
Analytical strategies for volatile compounds and gases	Genève	22.05.2015	GC-4f
Les nouvelles tendances HPLC: comment améliorer sa productivité au laboratoire?	Genève	27.05.2015	LC-3f

Es freut uns, Ihnen das Weiterbildungsprogramm 2015, das wir zusammen mit dem Centre de Compétence en Chimie et Toxicologie Analytiques (CCCTA) realisiert haben, vorzustellen.

Einzelmitglieder der folgenden Fachverbände können unsere Kurse zum vorteilhaften Mitgliedertarif besuchen:

Fachverband Laborberufe (FLB), Gesellschaft Deutscher Chemiker (GDCh), Schweizerische Arbeitsgemeinschaft für Spektrometrie und Elementaranalytik (SASP), Schweizerischer Chemikanten- und Cheministen-Verband (SCV), Schweizerische Gesellschaft für Lebensmittel- und Umweltchemie (SGLUC), Schweizerische Gruppe für Massenspektroskopie (SGMS) und Schweizerischer Verband Diplomierter Chemiker (SVC).

Falls Sie sich für unsere Veranstaltungen interessieren, erreichen Sie uns unter Telefon **058 765 52 00** oder Fax **058 765 58 01** oder mailen Sie an **verena.schmid@eawag.ch**. Online-Anmeldung im Internet unter: *www.scg.ch/kurse*

InCompany Training – Individuelle Beratung und Schulung

Im Rahmen des Weiterbildungsprogramms organisieren oder erarbeiten wir gemeinsam mit Ihnen InCompany-Schulungen und -Trainings nach Ihren Vorstellungen und Bedürfnissen. Profitieren Sie davon, dass wir für Sie

- Inhalte an firmenspezifische Anforderungen und Wünsche anpassen
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Ein weiterer Vorteil der InCompany-Trainings: für Ihre Mitarbeiterinnen und Mitarbeiter fallen keine Reise- und Übernachtungskosten an!

Experten stehen Ihnen für eine persönliche Bedarfsabklärung und Beratung gerne zur Verfügung.

Sie erreichen uns über
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