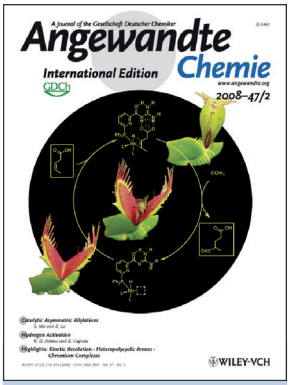
B. Breit

*The author presented on this page has recently published his **25th article** since 2000 in Angewandte Chemie:* "Catalytic Hydrogenation of Amides to Amines under Mild Conditions": M. Stein, B. Breit, *Angew. Chem.* **2013**, *125*, 2287–2290; *Angew. Chem. Int. Ed.* **2013**, *52*, 2231–2234.



The work of B. Breit has been featured on the cover of Angewandte Chemie: "A Supramolecular Catalyst for Regioselective Hydroformylation of Unsaturated Carboxylic Acids": T. Šmejkal, B. Breit, *Angew. Chem.* **2008**, *120*, 317–321; *Angew. Chem. Int. Ed.* **2008**, *47*, 311–315.

Bernhard Breit

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Awards:	**2000** Krupp Award of the Alfried Krupp von Bohlen und Halbach Foundation; **2003** Novartis Young Investigator Award
Current research interests:	Development of methods, concepts, and strategies for efficient and environmentally benign organic synthesis for targets including natural products; specifically: directed catalysis; stereospecific C–C bond formation with organometallic reagents; supramolecular concepts in homogeneous catalysis; DNA-inspired self-assembling molecular catalysts; asymmetric catalysis; development of atom-economic catalytic addition reactions
Hobbies:	Hiking, skiing, cooking, classical music, reading

My motto is … "simple things first".

My favorite composer is … Johann Sebastian Bach.

My favorite quote is … "If you want to build a ship, don't drum up people to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea" (Antoine de Saint-Exupéry).

If I could be any age I would be … as old as I am now (mid-forties). At this age, one combines gathered experience with both physical and mental strength and health.

My favorite time of day is … the early morning after running and a hot shower with a cup of freshly brewed coffee or sencha (Japanese green tea).

My favorite way to spend a holiday is … to go hiking in the mountains.

The secret of being a successful scientist is … hard labor, passion, and the will to build something that will last, but also the joy of gambling with the new and unknown.

My science "heroes" are … Emil Fischer and Albert Einstein.

If I had one year of paid leave I would … be liberated from all administrative work, and would love to focus completely on research.

The most important thing I learned from my students is … to slow down when writing on the blackboard … just kidding! They challenge me to explain clearly and precisely, and to focus on the most fundamental and essential content when teaching chemistry.

When I was eighteen I wanted to be … a chemist.

Chemistry is fun because … you combine exact science and methods with the element of creativity that otherwise can only be found in the arts.

Young people should study chemistry because … they will obtain a different view of the world surrounding us. There are countless exciting research topics, which at the end will severely influence and determine the well-being of the human race. Additionally, a degree in chemistry is the entry to a highly attractive and diverse job market in industry and academia.

Looking back over my career, I … would say, that it is hopefully to early to look back.

My favorite drink is … a good glass of Riesling from the Palatinate or a Grauburgunder (Pinot Gris) from the Kaiserstuhl.

How is chemistry research different now than at the beginning of your career?

A major difference is the enormous growth in numbers of original publications. Fifteen years ago, it was still possible to do the weekly literature studies by visiting the library and browsing the latest issues of the relevant scientific journals on a Saturday morning. Today, because of the enormous amount of published articles and the increasing density of administrative and also teaching loads, the literature study has unfortunately become a browsing of graphical abstracts. On the other hand, this electronic revolution makes it significantly more easy to get a desired scientific information from nearly any computer or iPad within seconds or minutes, which in turn accelerates progress in science. However, the best ideas still mostly develop from reading across the disciplines during a quiet and relaxed moment.

What is the secret to publishing so many high-quality papers?

You have to ask the right questions. Then you need a bunch of hopefully unique ideas, and finally and most importantly excellent and highly motivated students and co-workers, who make some of these ideas to become real. But still, to get from the first successful experiment to a final publication, it needs an additional portion of hard labor. To describe it in other words, we may borrow from Thomas A. Edison's definition of genius. Hence, in order to publish a meaningful paper, you need about 1% inspiration and 99% perspiration.

My 5 top papers:

1. "Hydrogen Bonding as a Construction Element for Bidentate Donor Ligands in Homogeneous Catalysis: Regioselective Hydroformylation of Terminal Alkenes": B. Breit, W. Seiche, *J. Am. Chem. Soc.* **2003**, *125*, 6608 – 6609.
   This is the first in, and probably most important of, a series of publications in which defined molecular catalysts inspired by DNA base pairing are formed by self-assembly through complementary hydrogen bonding. This approach significantly simplifies classical ligand synthesis, and additionally provides highly active and regioselective hydroformylation catalysts that operate even at room temperature and ambient pressure.
2. "Mechanistic Insights into a Supramolecular Self-Assembling Catalyst System: Evidence for Hydrogen-Bonding during Rhodium-Catalyzed Hydroformylation": U. Gellrich, W. Seiche, M. Keller, B. Breit, *Angew. Chem.* **2012**, *124*, 11195 – 11200; *Angew. Chem. Int. Ed.* **2012**, *51*, 11033 – 11038.
   This combined experimental and theoretical investigation allowed us to get insights into the origin of the extraordinary reactivity and selectivity of the above-mentioned self-assembled catalysts. Hence, the hydrogen-bonding system was identified as the origin of the catalyst's unique behavior, since it ensures both structural integrity and flexibility, which allows the ligand backbone to adapt to different coordination geometries throughout the catalytic cycle without significant energy penalties (adaptive behavior).
3. "A combinatorial approach to the identification of self-assembled ligands for rhodium-catalyzed asymmetric hydrogenation": J. Wieland, B. Breit, *Nature Chemistry* **2010**, *2*, 832 – 837.
   The construction of defined molecular catalysts through self-assembly that employs complementary hydrogen-bonding is intrinsically combinatorial. We demonstrated the full potential of this approach exemplarily for asymmetric hydrogenation. A 12×10 ligand library was prepared by a divergent synthesis. Through simple mixing of all components, a dynamic library of 120 chiral rhodium catalysts was formed and was screened by an iterative library deconvolution strategy to unravel the most active and enantioselective catalysts. This procedure is significantly more time- and resource-saving than classical parallel library screening.
4. "Branched-Regioselective Hydroformylation with Catalytic Amounts of a Reversibly Bound Directing Group": C. U. Grünanger, B. Breit, *Angew. Chem.* **2008**, *120*, 7456 – 7459; *Angew. Chem. Int. Ed.* **2008**, *47*, 7346 – 7349.
   Since the beginning of my independent scientific career, I have been fascinated by directed catalysis. At the beginning, we had success with substrate-bound catalyst-directing groups used in stoichiometric amounts. This allowed us to achieve unique regio- and stereoselectivities, for example in the rhodium-catalyzed hydroformylation reaction. However, since the beginning of this project, we aimed to develop covalent but reversibly bound directing groups, which would allow the use of only catalytic amounts. It took us indeed more than a decade to realize this dream, which is documented in this publication. A simple diphenylphosphinite could indeed serve as a dynamic catalyst-directing group, and by exchange with the hydroxy function of homoallylic and bis(homoallylic) alcohols, unique regio- and stereoselectivities became possible upon hydroformylation. Meanwhile, this general principle has been applied by us and others to other reactions.
5. "Redox-Neutral Atom-Economic Rhodium-Catalyzed Coupling of Terminal Alkynes with Carboxylic Acids Toward Branched Allylic Esters": A. Lumbroso, P. Koschker, N. R. Vautravers, B. Breit, *J. Am. Chem. Soc.* **2011**, *133*, 2386 – 2389.
   This paper marks the beginning of our most recent research topic that focuses on the development of atom-economic addition reactions of pronucleophiles to alkynes and allenes. We report on a new reaction that allows coupling of terminal alkynes and carboxylic acids to furnish branched allylic esters, which are important building blocks in organic synthesis. Meanwhile, the reaction has been developed to enable the preparation of macrolactones. Furthermore, enantioselective reaction variants are made possible by applying chiral catalysts.

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