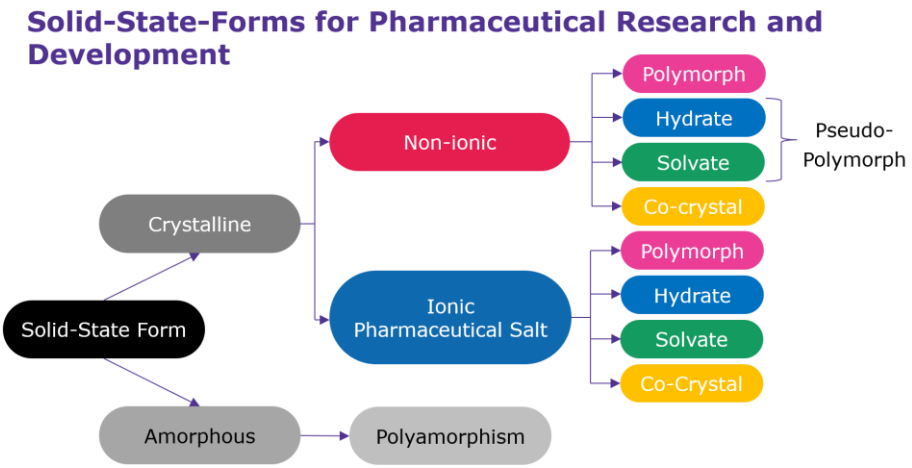
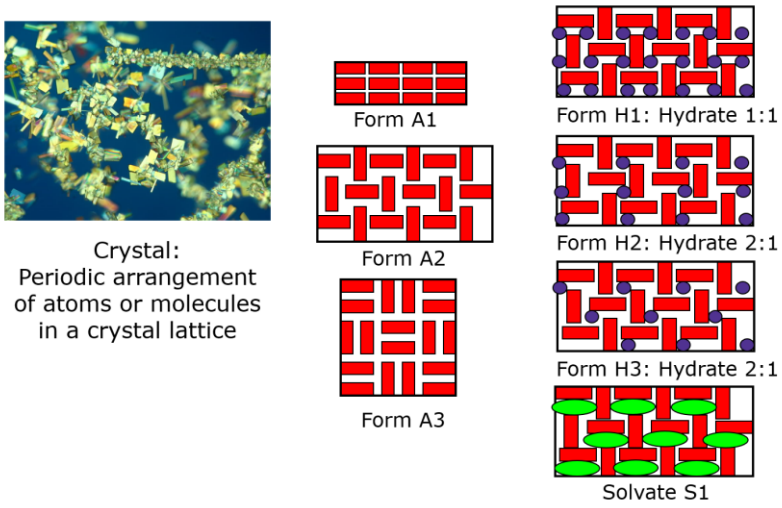
Privatdozent Dr. habil. Christoph Saal

During the last decades designing efficient and safe drugs has been facilitated by a better structural understanding of drug targets using techniques such as X-ray diffraction, molecular modelling, electron diffraction and many methods to characterize ligand binding to proteins of interest. However, these powerful tools have led to drug molecules with more and more challenging physico-chemical properties such as e.g., solubility. Accordingly, discovering new chemical entities which act in an efficient way to fight diseases has been facilitated by above mentioned approaches. However, at the same time delivering such molecules to the human body became more challenging. As for reasons of patient convenience and compliance most drugs are administered orally, solubility and dissolution of drugs in the gastrointestinal tract is key. During pharmaceutical research and development ways must be found how to make a drug sufficiently soluble to guarantee a sufficient bioavailability to make the drug working efficiently.

As solubility represents an equilibrium state between dissolved and undissolved material, solid-state properties of drugs become relevant in this context. Researchers find a plethora of tools in the solid-state-selection toolbox to improve solubility, dissolution and other physico-chemical properties which are relevant for processing of the active pharmaceutical ingredient (API), its stability, formulation and finally stability of the drug product. Amongst such solid-state forms are traditional approaches such as pharmaceutical salts, polymorphs, pseudo-polymorphs but also new techniques such as co-crystals, co-processed APIs. Additionally, whereas selection of a solid-state form for an API has been an isolated task during the past, today this has become a multidisciplinary one including a lot of API-manufacturing and formulation aspects, e.g., particle engineering and bio-enabling formulations but covering also other disciplines such as bio-pharmacy, ADME aspects as well as aspects from toxicology, pharmacology and clinical topics.




## Research Interests:

- Optimization of solubility and dissolution of low soluble drugs
- Solid-state-form-selection and physico-chemical characterization of drug candidates
- Pre-formulation of drug candidates

## Curriculum Vitae

- 10/2018
- Habilitation – Goethe University Frankfurt
- Physico-chemical aspects for solid-state forms in pharmaceutical research and development

- 03/1995-05/1998
- Ph.D. - Technical University of Darmstadt
- Investigations on magnetic and electronic structures of mixed-valent and homo-valent 3-d-transition-metal complexes

- 09/1994-02/1995
- Diploma - Technical University of Darmstadt
- Investigations on Photoluminescence of C60 und C70

- 05/1990-02/1995
- Academic Studies in Chemistry
- Technical University of Darmstadt

## Professional Experience

- Director Site-Management Analytics Healthcare – Merck KGaA – Darmstadt
- Member of several EDQM (European Directorate for the Quality of Medicine and Healthcare) Expert Groups (e.g., General Methods)
- Section Editor of "European Journal of Pharmaceutical Sciences"
- Member of the Editorial Advisory Board of "Journal of Pharmaceutical Sciences"

## Publications

- M. Vertzoni, J. Alsenz, P. Augustijns, A. Bauer-Brandl, C. Bergström, J. Brouwers, A. Müllerz, G. Perlovich, C. Saal, K. Sugano, C. Reppas, „UNGAP best practice for improving solubility data quality of orally administered drugs", J. Pharm. Sci., accepted for publication.

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- F. Ditzinger, D.J. Price, A. Nair, J. Becker-Baldus, C. Glaubitz, J.B. Dressman, C. Saal, M. Kuentz, „Opportunities for successful stabilization of poor glass-forming drugs: a stability-based comparison of mesoporous silica versus hot melt extrusion technologies”, Pharmaceutics 2019, 11, 577, doi:10.3390/pharmaceutics11110577

- F. Ditzinger, N. Köhl, D. Price, S. Jancovic, G. Tsakiridou, S. Aleandri, L. Kalantzi, R. Holm, A. Nair, C. Saal, B. Griffin, M. Kuentz, “Lipophilicity and hydrophobicity considerations in bio-enabling oral formulations approaches”, J. Pharm. Pharm. 2018, doi10.1111/jphp.12984

- S. Jankovic, G. Tsakiridou, F. Ditzinger, N.J. Koehl, D.J. Price, A.R. Ilie, L. Kalantzi, K. Kimpe, R. Holm, A. Nair, B. Griffin, C. Saal, M. Kuentz, “Application of the solubility parameter concept to assist with oral delivery of poorly water-soluble drugs”, J. Pharm. Pharm. 2018, doi10.1111/jphp.12948

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- S. Paulekuhn, J.B. Dressmann, C. Saal, „Salt Screening and Characterization for poorly soluble, weak basic Compounds: Case Study Albendazole”, Die Pharmazie, 2013, 68, 555-564.

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