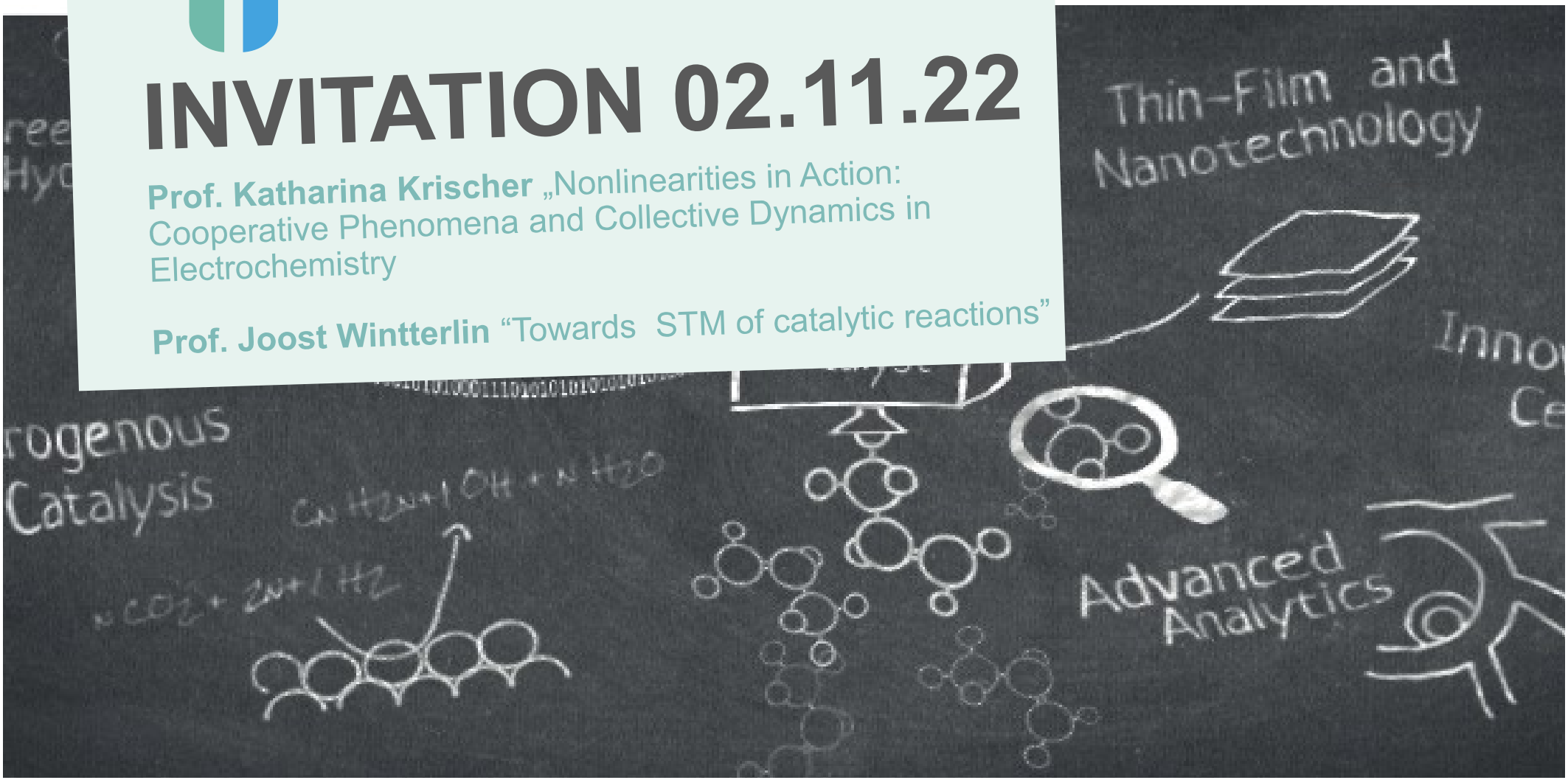
CatLab
CATALYSIS LABORATORY

INVITATION 02.11.22

Prof. Katharina Krischer „Nonlinearities in Action: Cooperative Phenomena and Collective Dynamics in Electrochemistry

Prof. Joost Wintterlin “Towards STM of catalytic reactions”



FRITZ-HABER-INSTITUT
MAX-PLANCK-GESELLSCHAFT

MAX-PLANCK-INSTITUT FÜR
CHEMISCHE ENERGIEKONVERSION

HZB Helmholtz Zentrum Berlin

HIGHLIGHT LECTURE

MODERATOR

Prof. Dr. Robert Schlögl,
Fritz-Haber-Institut

PROF. KATHARINA KRISCHER

CHEMICAL PHYSICS FAR FROM EQUILIBRIUM
TECHNISCHE UNIVERSITÄT MÜNCHEN

In this talk, I will discuss recent examples from electrochemistry in which the system's behavior is 'more than the sum of its parts and nonlinear interactions generate complex forms of organization. Thereby, I will highlight general conditions that generate certain types of cooperative phenomena.

Experimental examples range from electrocatalytic reactions, to the electrooxidation of photoelectrodes. The patterns forming can be understood in the framework of 'many particle models' with nonlinear and nonlocal interaction between the particles, as they are often found in electrochemical systems.

HIGHLIGHT LECTURE

MODERATOR

Prof. Dr. Robert Schlögl,
Fritz-Haber-Institut

PROF. JOOST WINTTERLIN

DEPARTMENT CHEMIE AND CENS
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN

Scanning tunneling microscopy (STM) regularly offers atomic resolution, can work at high pressures and only interacts weakly with matter - seemingly perfect conditions for gaining access to the microscopic processes on a catalyst surface. On the other hand, the number of examples in which working catalysts have actually been imaged with the STM has remained small. This contradiction is due not so much to fundamental problems as to numerous practical, experimental difficulties. In this talk, I present the results of our efforts to resolve some of these difficulties. In one project, a combination of a high-pressure STM and a special gas chromatograph was developed.

With this system, the co-catalyzed Fischer-Tropsch synthesis, an industrial process for the production of liquid hydrocarbons from mixtures of CO and H2 (synthesis gas), was investigated. Under reaction conditions, Co single crystals serving as model catalysts were imaged with atomic resolution and the catalytic turnover frequency was measured under the same conditions. The correlations in these data provide clear indications of the active sites of this reaction. In a second project, high-speed STM technique was further developed in order to investigate dynamic processes in the adsorption layer. Surface diffusion, which determines collision rates between reacting particles on a catalyst surface, was studied. It is shown that diffusion can be extremely fast even at the high coverages typically present on an operating catalyst. A novel 2D lattice diffusion mechanism is proposed

PLEASE REGISTER HERE

Registration Deadlines:
Onsite: 28th October 2022, 1pm
Online: no deadline

We are pleased to welcome you on
Wednesday, 2nd November at 10:15 am.
Further information on www.catlab.berlin