SwissCAT+ - Hub for Data-driven, Automated and High-throughput Catalysis R&D

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The ETH domain has recently launched the Catalysis Hub SwissCAT+, a technology platform dedicated to automated high-throughput and data-driven experimentation in the field of catalysis. The Hub located at ETH Zürich (SwissCAT+ East) focusses on heterogeneous catalysis and the Hub at EPF Lausanne on homogeneous catalysis. SwissCAT+ East hosts state-of-the-art robotic and high-throughput equipment to synthesize, characterize and evaluate catalysts augmented by artificial intelligence/machine learning algorithms to analyze data and optimize workflows.[1] As an open-access technology platform, SwissCAT+ East offers tools and expertise to the broad scientific community investigating catalytic processes, particularly for the production of sustainable fuels and chemicals.

In this presentation, the capabilities of SwissCAT+ East for performing automated high-throughput synthesis, characterization and testing of heterogeneous catalysts will be introduced. It includes the synthesis of materials via incipient wetness impregnation and zeolites as well as parallel fixed-bed reactor testing at up to 925 °C and 100 bars (e.g. for CO_2 hydrogenation, dry reforming, methanol-to-olefin, propane dehydrogenation). Finally, a case study for a closed-loop workflow for the synthesis and optimization of catalysts for CO_2-to-CH_3OH conversion guided by Bayesian optimization will be discussed.

[1] P. Laveille, P. Miéville, S. Chatterjee, E. Clerc, J.-C. Cousty, F. de Nanteuil, E. Lam, E. Mariano, A. Ramirez, U. Randrianarisoa, K. Villat, C. Copéret, N. Cramer, *Chimia* **2023**, *77*, 154, DOI: 10.2533/chimia.2023.154.