

**CPP 35: Topical Session: Data Driven Materials Science - Machine Learning for Production
(joint session MM/CPP)**

Time: Monday 17:00–17:30

Location: BAR 205

Topical Talk CPP 35.1 Mon 17:00 BAR 205
First-principle infused machine learning models allowing digital twins to self-organise production processes — ●MARCUS NEUER — Sohnstr. 65, 40237 Düsseldorf

For European process industries, optimization of the production route plays an increasingly important role for keeping a competitive edge in a tough market. New concepts like digital twins arrived recently in real-world applications. They allow an agent-based, active self-organisation of the route and introduced the ability to apply models live, during the

processing. These models may be analytically derived, data-based or a combination of both: first-principle infused machine learning models. Herein, the stochasticity of the process is modelled by the machine learning approach, while an analytical first-principle backbone acts as basis. With the ability to forecast its potential future, materials and products have new degrees of freedom. They optimize their future path with respect to energy consumption, order matching and material homogeneity. The presented concepts are shown in real-world production environments, where they have already reached technical readiness to sustain continuous production.