# C14: Semi-Mechanistic Modelling of Fracture Mechanisms of Engineered Artificial Minerals

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The research project "Semi-Mechanistic Modelling of Fracture Mechanisms of Engineered Artificial Minerals" aims to develop a new model for predicting the breakage behaviour of slag systems and their behaviour in comminution processes. This model is based on the combination of Discrete Element Method (DEM) simulations with machine learning methods. The main objective is to predict the comminution of complex engineered minerals to enable targeted recovery of individual components from engineered minerals through comminution processes.

The research objectives include the development of new fracture and strength models for multi-component engineered artificial minerals (EnAMs) based on complex phase composition and structural parameters. These models will be implemented in a discrete element simulation (DEM) environment and in fluid flow simulations to predict different comminution processes.

The project will be supported by extensive experimental investigations and numerical descriptions of the breakage behaviour of EnAM particles. This includes the establishment of methods to determine the structural parameters and phase composition of the particles, micromechanical characterisation of single particle deformation and breaking strength, and data-driven modelling of fracture behaviour using Artificial Neural Networks (ANNs) and Genetic Programming.

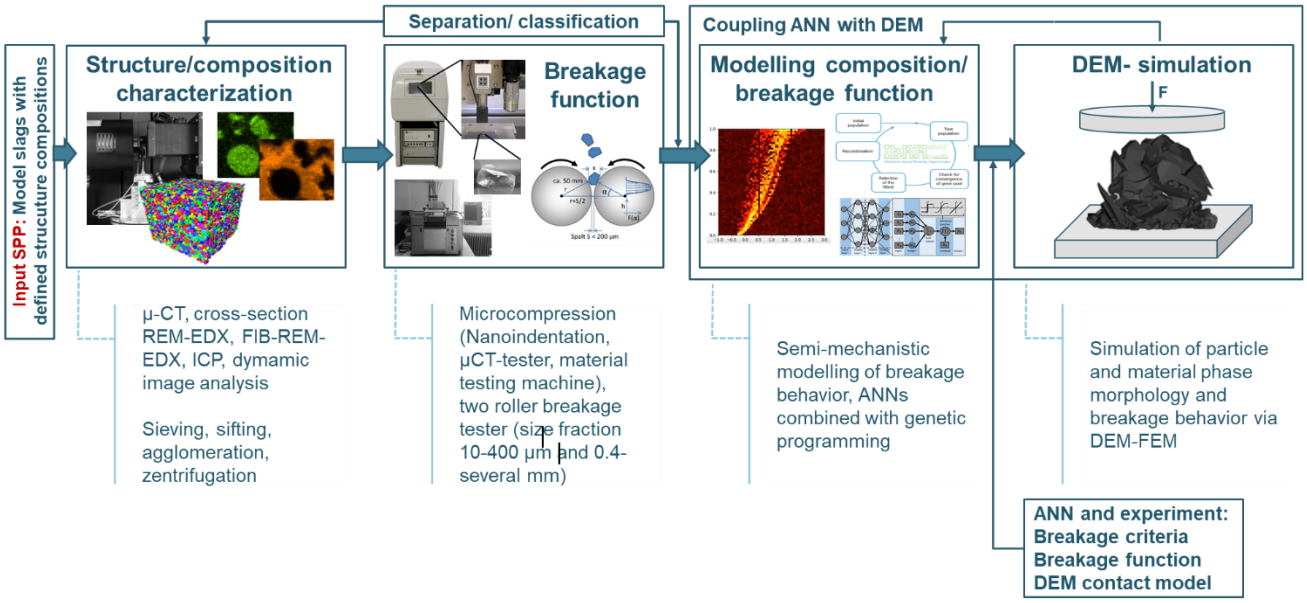


Figure 1: *Work program including methods for the determination of strength and breakage function depending on the structural properties and phase composition of EnAM particles.*