Development of Base Metal Alloy Catalysts by Cyber-physical Loop Using Electronic Laboratory Notebook

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We have constructed a cyber-physical loop for finding Ni-Ta binary alloy phases, which are based on experimental data, an electronic laboratory notebook and a machine learning model. In this study, we prepared these alloys by a new preparation method. Therefore, we have no prior information about what the obtained phases are assigned to. In this situation, the cyber-physical loop is a potent tool to construct a phase diagram of this alloy system. For making the loop, we used an electronic laboratory notebook (ELN) and the machine learning method of phase diagram construction (PDC). ELN is convenient for compiling the experimental information, resulting in construction of a database of the experiments. PDC can reduce the required numbers of the experiments for the phase diagram construction by 80% as compared to the required numbers with a random search. In this poster, we will display how to combine ELN and PDC for making the cyber-physical loop, resulting in construction of the phase diagram of the Ni-Ta binary alloys.