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Experimental Data Infrastructure with BENTEN for Fuel Cell Project at SPring-8

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New project to construct experimental database for evaluation of materials and components of Polymer Electrode Fuel Cells (PEFCs), has been founded by New Energy and Industrial Technology Development Organization (NEDO) since 2020 year [1]. In this presentation, we report on the experiment data infrastructure for the Fuel Cell project at synchrotron radiation facility, SPring-8.

We newly developed the data infrastructure using experimental data transfer system BENTEN [2][3]. BENTEN provides easy-to-use interface for data registration and data access using REST API. Registered data can be shared with limited members in the project. Experimental data with synchrotron radiation X-ray analysis methods for XRD, XAFS, SAXS, PDF and HAXPES were accumulated using multiple experimental stations. To realize reliable database, we promoted standardization of the procedure for measurement and analysis to have same results even if different person is involved. Standardization of experimental data format is also one of key issues. We attached a metadata file with unified format with YAML. In this file, sufficient metadata such as data contact person, persistent ID, conditions of sample, measurement and analysis etc. are flexibly defined hierarchically. To reduce the cost to prepare metadata, we setup templates to record metadata for each measurement and also promoted auto-generation.

In summary, we developed experiment data infrastructure with BENTEN for PEFCs technology evaluation, and established the procedure to construct experimental database. We plan to develop flexible data retriever for data utilization, and also start to transfer data catalogues into data platform in National Institute for Materials Science (NIMS) to promote material informatics.

References:

- 1) https://www.nedo.go.jp/activities/ZZJP_100182.html
- 2) T. Matsumoto et al., Proceedings of ICALPECS 2019, p.702-706
- 3) T. Matsumoto et al., AIP Conference Proceedings 2054, 060076 (2019)

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