Korea Nuclear Data Center (KNDC)
Progress Report for period 2019-2021

Technical Meeting on the International Network of Nuclear Reaction Data
Centers (NRDC 2021)
4 - 7 May, 2021

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1. General

Korea Nuclear Data Center (KNDC, formerly 'Nuclear Data Evaluation Lab.') was established in 1997 to start research on nuclear data in Korea and joined the International Network of Nuclear Reaction Data Centers (NRDC) in 2000. KNDC at Korea Atomic Energy Research Institute (KAERI) performs the following main tasks:

- Evaluation and method development for nuclear reaction data

- Establishment of processing and validation system of nuclear reaction/covariance data

- Measurement of nuclear reaction data and establishment of measurement facility

- Production and validation of atomic/molecular collision data

The mission of our center includes disseminating the outcomes of cooperation with international networks as well as promoting nuclear data research activities and supporting nuclear/radiation R&Ds in Korea. KNDC is also coordinating the measurement activities using domestic accelerators for producing various nuclear reaction data.
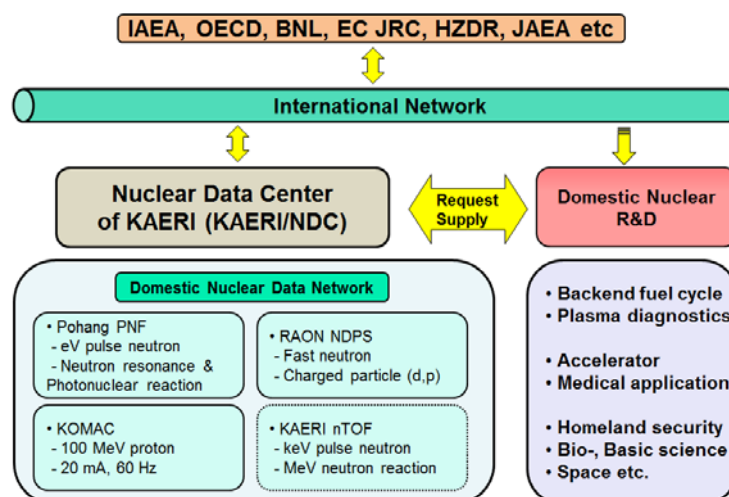
KNDC continues to cooperate with the international nuclear data network as follows:

- Participating in IAEA CRP, TM, and CM on nuclear data evaluation, nuclear data processing and validation, atomic/molecular data network, etc.
- Collecting nuclear reaction measurement data in Korea for EXFOR compilation under the guidance of IAEA/NDS
- Participating in the JEFF and WPEC subgroups of OECD/NEA
- Conducting joint research on evaluation, measurement, and validation of nuclear data with foreign research institutes

As of 2021, KNDC consists of 9 regular staffs, a post-doctor, an intern researcher, and a Ph.D. student. They are working in the following fields:

- Nuclear data evaluation: 2 regular staffs
- Nuclear data measurement: 3 regular staffs
- Nuclear data processing/validation/application: 2 regular staffs, a post-doctor, a Ph.D. student
- Atomic/molecular data production: 2 regular staffs, an intern researcher

2. EXFOR Activity

The compilation of nuclear reaction data in Korea continues to be carried out under the guidance of IAEA/NDS. Since the last meeting in 2019, 12 entries have been finalized for the EXFOR DB (including 9 new entries) and 2 entries have been transmitted after compilation. (See Table 1.)

Table 1. Compilation statistics of KNDC

No.	TRANS	ENTRY	SUBJECT	STATUS
1	G043	G3132	Gamma	EXFOR
2	G043	G3133	Gamma	EXFOR
3	D119	D7023	Proton	EXFOR
4	D119	D7024	Proton	EXFOR
5	3188	30844	Neutron	EXFOR
6	G044	G3134	Gamma	EXFOR
7	3189	30845	Neutron	EXFOR
8	G044	G3135	Gamma	EXFOR

9	D123	D7025	Proton	EXFOR
10	D127	D7026	Proton	EXFOR
11	D127	D7027	Proton	EXFOR
12	3198	30846	Neutron	EXFOR
13		30847	Neutron	Compiled
14		30848	Neutron	Compiled

- **Checking Code**

The draft was checked through a tool of JCPRG. (http://www.jcprg.org/exfor/tool/)

3. Nuclear Data Activities

3.1 Evaluation

KNDC participated in the IAEA CRP (Updating the Photonuclear Data Library and Generating a Reference Database for Photon Strength Function), which ended in early 2020, and conducted photonuclear data evaluation based on the latest measurement data and theory. Photonuclear data of 30 nuclides evaluated in KNDC were listed in the new 'IAEA Photonuclear Data Library 2019'.

A study on improving the neutron-induced charged particle emission reaction data of ENDF/B-VIII.0 is being carried out through the International Nuclear Energy Research Initiative (I-NERI) project with Los Alamos National Laboratory (LANL). A collaborative work is underway to analyze the experimental data measured in LANSCE and evaluate/update the accompanying data.

3.2 Measurement

The production cross section for the $^{nat}Ni(p,x)$ reactions was measured using a stacked-foil activation technique with a proton energy of 57 MeV at the 100 MeV proton linac in KOMAC facility. The measured cross sections were compared with the experimental data in the literature and the data from the TENDL-2017 library. The present results are lower than the other experimental data in the investigated energy region. These are preliminary data and are currently being analyzed.
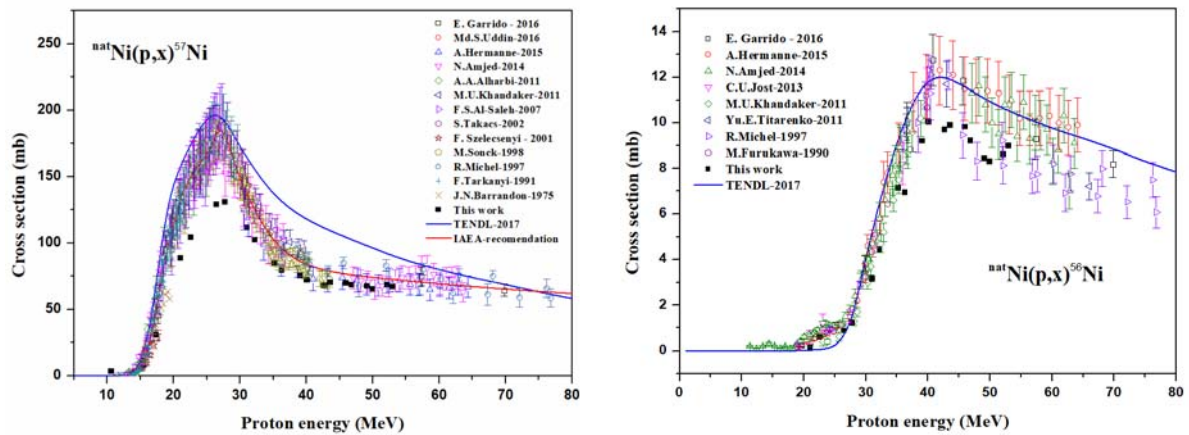
3.3 Cooperation

The Workshop on Reactor Physics and Nuclear Data was held in Ansan, Korea on November 8 ~ 9, 2019. This workshop was organized by Sungkyunkwan University (SKKU) and supported by KNDC. The purpose of the workshop was to share and discuss recent research activities on subcritical reactor physics, Th-based transmutation reactor, and nuclear data measurement and evaluation.


3.4 Web Service

KNDC provides the following three main web services. These websites are constantly being updated.

- Nuclear Data Chart (http://atom.kaeri.re.kr/nuchart/): nuclide information, nuclear reaction data, cross section data plot and comparison
- Application Library (http://atom.kaeri.re.kr/NDVG/): processed nuclear data library for Monte Carlo (ACE) and deterministic (MATXS) neutron transport codes, processed

covariance data (COVFIL), fission product yield and decay data for SCALE

- Atomic Data (http://pearl.kaeri.re.kr/pearl/): atomic database including photoionization cross section, electron impact ionization (EII) rate coefficient, and dielectronic recombination (DR) rate coefficient
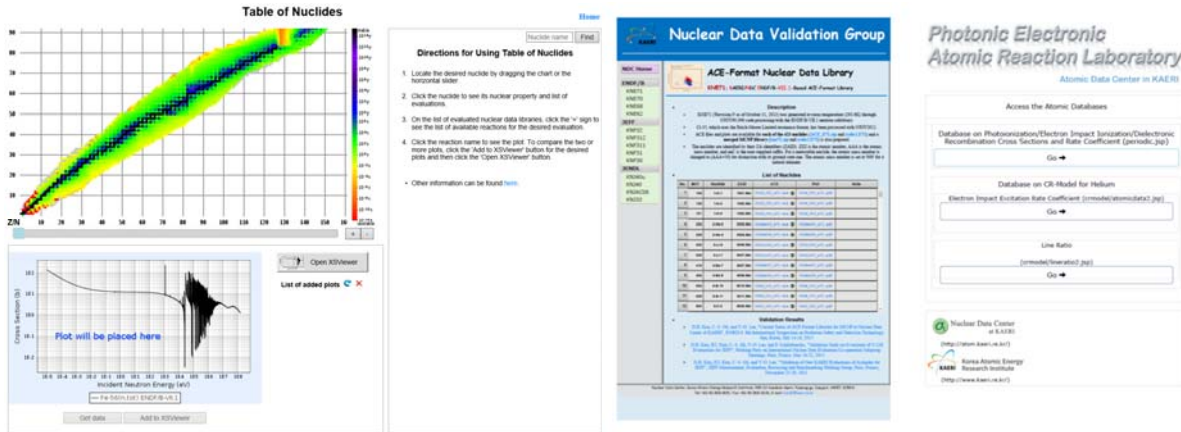
3.5 Support for Nuclear/Radiation R&Ds

KNDC supports domestic and foreign nuclear/radiation R&Ds by providing nuclear data related information, how to process nuclear data, working libraries for application, etc. The main support details were as follows:

- ACE-format libraries (with 75 temperatures) based on ENDF/B-VII.1 for VHTR analysis (KAERI)

- ACE-format libraries (with 18 temperatures) based on ENDF/B-VIII.0 for research reactor analysis (KAERI)

- ACE-format TSL library of SiC for neutron irradiation analysis (KAERI)

- How to extract neutron/proton reaction cross sections, photonuclear data, prompt gamma spectrum, and decay data from ENDF files (KAERI, universities, research institutes, company)

- How to process proton/neutron reaction data of JENDL-4.0/HE, how to use TRANSX/BBC with MATXS-format library, etc. (universities)

- Neutron absorption cross sections for development of neutron absorbing material (KAERI)