Presentation of "Renatech", the French network of academic microfabrication clean-rooms

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Following the "NNIN" american network of clean-rooms, the French government decided in 2003 to create a French network of "large" clean-rooms called "Renatech". Now, the five Renatech members are: IEMN in Lille (north of France), C2N in Orsay and in Marcoussis (near Paris), FEMTO-ST in Besançon (east of France), LTM in Grenoble (southeastern France) and LAAS in Toulouse (southwestern France). Each technical facility has specific strengths. The missions of Renatech are (1) to improve French nanotechnology know-how & equipment, (2) to rationalize the national equipment, (3) to provide fabrication service to external scientific or industrial users, (4) to implement a national purchase strategy for heavy equipment. Renatech is exclusively dedicated to devices for low TRLs research either for academics or industrials, whereas CEA-Leti Nanofabrication center in Grenoble is more focused to nanofabrication with industrial standards (higher TRLs). Users requiring a micro- or nanofabrication service can access to Renatech through its website https://www.renatech.org, including an english version for foreigners.

User access. Renatech provides access to its microfabrication facilities to a large user's community that will receive access and training, to fabricate the devices by themselves. Any potential user, needing microfabrication tools can register through the Renatech website and request an evaluation by Renatech technical experts of the technical feasibility and cost of its nanofabrication project. After agreement, the users receive a standard clean-room training and specific trainings on the equipment required for the project. Eventually, they will access freely to clean-room equipment through reservation on the facility website. All users should write a one-page report describing their project's goals and main results. The access procedure is exactly the same for a user belonging to the laboratory that runs the facility and for external users. Indeed, about half of the ~950 projects are from external laboratories or from companies (one third of the external projects includes at least one industrial partner) : hence, Renatech trains about 500 R&D facility users each year.

***Undergraduate training & network promotion*.** Renatech clean-rooms are also used to train about 600 undergraduate students per year and to provide continuous training to 92academics or industrial trainees. Moreover, Renatech promotes Nanotechnologies toward primary schools and general public (1700 persons from general public have visited Renatech clean-rooms in 2015) and is advertising through its presence at international conferences such as MNE, Euronanoforum or Nanotech-Tokyo.

***Scientific results*.** In 2015, Renatech facilities have been at the origin of more than 770 publications (80% of the authors not being affiliated to Renatech laboratories), 154 invited papers, 27 major awards or distinctions and 28 patents.

***Networking*.**Together with CEA-Leti, Renatech is organizing an annual presentation of nanofabrication facilities for potential users. Technical staff members of all facilities have also created "technical expert groups" that meet at least once a year to exchange on new technologies and equipment.

International Collaborations. Renatech has strong collaborations with Univ. of Sherbrooke (UdS) in Canada (exchanges of scientists / PhD students between UdS and the 5 Renatech facilities). The network is also in close contact with EU countries that have created national clean-room networks (Sweden, Norway, Netherlands).

***Perspectives*.** Renatech members work on the Renatech+ initiative where many small clean-room facilities (more than 20) distributed throughout France will join the Renatech offer in the field of micro&nanotechnology. It is also envisioned to extend Renatech international partnerships, especially with the "Nanotechnology Platform" network of Japan, and to contribute to the creation of a network of open-access clean-room facilities at European scale (EuroNanoLab).