

ESSL EVALUATION REPORT

1) Graphene and two dimensional materials for nanoelectronics (ESSL)

PI: Dr. Dimoulas

1. Scientific excellence / originality of the research conducted by the group.

The ESSL group started at INN as an epitaxy group focused on the growth and characterization of epitaxial semiconductors. Over time it evolved and capitalizing upon the expertise and the unique state-of-the-art facilities (incl. MBE, ARPES, STM, RHEED, XPS/UPS) covering growth and surface analytic techniques is currently exploring MBE approaches for the growth of 2D materials. The group, over the years, has followed unconventional and innovative research paths which have reflected upon the high quality of publications, the securing of competitive grants and the winning of a highly prestigious ERC AdvGrant in the past. This group should make a role model for the structure, mentality and quality of research for the sort of groups INN should aim to build.

2. Quality of the publication record and the funding record of the Group.

The group has published over 25 papers in highly reputed journals, with the majority in Q1 journals. This is an excellent track record, especially considering that this group consists of one PI who leads several postdocs and students. Of particular positive note is that in the majority of the papers reported the PI features as the leading author. The attendance and dissemination of the results in conferences is also in accordance with the group structure and size and is found to be adequate. In terms of funding, the group has attracted an impressive amount of grants – especially from the EU and several highly competitive calls (FET, MarieCurie etc.).

3. Quality of the National and International collaborations of the Group.

The group has established a network of collaborators across Europe from highly reputed Institutes and research labs (e.g. IBM Zurich, CEA, CNRS, ICN2) and synchrotron facilities (including ESRF, ALS, Soleil).

4. Quality of strategic plan and validity of future goals.

Following the innovative spirit, the PI has identified two main research thrusts as a strategic plan of his group. The first is on developing neuromorphic technologies for bio-inspired computing that will leverage the recent findings and know-how of the group on 2D-ferromagnetic metals and topological materials and hafnia ferroelectrics. The second thrust is to develop quantum technologies employing materials with large spin-orbit coupling and topological materials. Both are exciting and fast-growing fields with several EU calls around those topics and research produced within those fields is very likely to be published in highly prestigious journals. The group already has several projects to leverage findings and synergies to implement the strategy. Moreover, the group has identified synergies within INN to accomplish its vision for quantum technologies.

5. Overall Evaluation of the progress during the past period years and potential for future growth.

This group has the closest structure one typically finds in highly performing research groups abroad, i.e. one single PI with several postdocs and PhD students and an outstanding track record of funding, research output and state-of-the-art facilities. The group has demonstrated capacity and potential to evolve and change fields systematically, building upon previous expertise and knowledge but always expanding into new directions. This is a very healthy approach for high-quality research and the group has very strong potential for growth in the future.