



Contribution ID: 244

Type: **Orale**

In-situ metal contact formation in semiconducting NWs using transmission electron microscopy

Friday, 12 July 2019 09:30 (30 minutes)

Semiconducting nanowires (NWs) are widely studied because the properties that stem from their three-dimensional, nanoscale nature open new opportunities for device design. Yet, to allow successful device integration, the quality of the NW/metal contacts and the control of carrier concentration are of paramount importance. We describe different kinds of semiconducting NW devices fabricated on electron transparent Si₃N₄ membranes, and we show how in-situ electrical transmission electron microscopy (TEM) can contribute to the understanding of NW contact formation.

We demonstrate an original approach to create an atomically abrupt contact with low electrical resistance on NWs of group IV (silicon and germanium) using a thermally- induced propagation reaction of Al and Cu in the extremities of a Ge or SiGe NW. To understand and control the metal diffusion into the NW that creates a metallic phase, detailed characterization at atomic length scales is necessary to understand how the metal atoms diffuse and incorporate into the formed phase at the reaction front and how these parameters relate to the electrical properties of the same interface. We combine both in-situ phase propagation of a metal-semiconductor phase of Cu and Al in Ge and SiGe NWs in the TEM with more detailed structural and chemical characterization after the reaction has finished to understand the diffusion phenomena in these nano objects.

Choix de session parallèle

6.2 Techniques couplées et analyses multispectrales dans le domaine des matériaux

Primary authors: LUONG, M. A. (Université Grenoble Alpes, Grenoble - Institut Neel, CNRS, 25 rue des Martyrs, F-38042 Grenoble, France); EL HAJRAOUI, K. (Université Grenoble Alpes, Grenoble - Institut Neel, CNRS, 25 rue des Martyrs, F-38042 Grenoble, France); ROBIN, E. (Université Grenoble Alpes, Grenoble - INAC, CEA-Grenoble, 17 avenue des Martyrs, F-38054 Grenoble, France); MONROY, E. (Université Grenoble Alpes, Grenoble - INAC, CEA-Grenoble, 17 avenue des Martyrs, F-38054 Grenoble, France); ZEINER, C. (Institute for solid state electronics, Vienna, Autriche); LUGSTEIN, A. (Institute for solid state electronics, Vienna, Autriche); LOPEZ HARO, M. (Inorganic chemistry department, University of Cadiz, Cadiz, SPAIN); KODJIKIAN, S. (Université Grenoble Alpes, Grenoble - Institut Neel, CNRS, 25 rue des Martyrs, F-38042 Grenoble, France); BRUNBAUER, F. (Institute for solid state electronics, Vienna, Autriche); ROUVIERE, J. L. (Université Grenoble Alpes, Grenoble - INAC, CEA-Grenoble, 17 avenue des Martyrs, F-38054 Grenoble, France); DEN HERTOOG, Martien (Université Grenoble Alpes, Grenoble - Institut Neel, CNRS, 25 rue des Martyrs, F-38042 Grenoble, France)

Presenter: DEN HERTOOG, Martien (Université Grenoble Alpes, Grenoble - Institut Neel, CNRS, 25 rue des Martyrs, F-38042 Grenoble, France)

Session Classification: Séance Parallèle