25e Congrès Général de la Société Française de Physique

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PL-APT: Photoluminescence at atomic scale

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Correlative microscopy allows obtaining the better of different techniques and can overcome their mutual drawbacks.
For example, micro-photoluminescence (µPL) is a good technique to characterize the structure of a material by measuring energy level of quantum dot, quantum well or colour centres. However, in most of the case, spatial resolution is limited by diffraction (0.2-1 µm) and actual composition of the structure can be only obtained with model or other analysis techniques.
In this case, analytic instrument like Atom Probe Tomography (APT) can be used. APT allows measurement of materials composition at atomic scale (0.1-0.5nm) and in 3d. However, it not possible to directly link individual structure composition obtained in APT to the previous optical measurements, only a statistical correlation can be done.
In this presentation, we will present a new instrument that combines the better of the two worlds, the Photo-Luminescent Atom Probe Tomography (PL-APT). PL-APT combines an in situ µPL in an APT chamber. The UV laser, used in APT to perform time of flight mass spectrometry of a tip shaped sample, excites also the sample and produces a PL signal that is collected and analysed during APT measurement.
In this presentation we will present this original instrument, and show that we were able to measure composition at atomic scale of different quantum wells distant of less than 100 nm and separate their individual optical signatures.

Choix de session parallèle

6.2 Techniques couplées et analyses multispectrales dans le domaine des matériaux

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