

Architecture & Design of Molecule Logic Gates and Atom Circuits

AtMol International Workshop 2012
January 12-13 Barcelona-Spain



Background

European Commission FP7 ICT Call 6

« *Molecular Scale Devices and Systems* »

23 proposals received by the ICT « Future and Emerging Technologies » Unit

4 selected in June 2010

- | | |
|-----------------------------------|--------------------------------|
| - Diamant (Coord.: F. Jelezko) | EU Budget: 3 Meuros, 3 years |
| - Focus (Coord.: L. Bardi) | EU Budget: 2.5 Meuros, 3 years |
| - Elfos (Coord.: H. van der Zant) | EU Budget: 2.5 Meuros, 3 years |
| - AtMol (Coord.: C. Joachim) | EU Budget: 6.9 Meuros, 4 years |



ICT Call 6
FP7-ICT-2009-6



**ATOMIC SCALE AND SINGLE MOLECULE
LOGIC GATE TECHNOLOGIES**

(January 2011- December 2014)

Coordinator: C. Joachim

Project Number : 270028



Participant no.	Participant organisation name	Part. short name	Country
1 (Coordinator)	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CEMES Laboratory	P1-Toulouse	FRANCE
2	COMMISSARIAT A L'ENERGIE ATOMIQUE (CEA)	P2-Grenoble	FRANCE
3	PHANTOMS FOUNDATION	P3-Madrid	SPAIN
4	ICIQ Tarragona	P4-Tarragona	SPAIN
5	CSIC Barcelona	P5-Barcelona	SPAIN
6	MPG - FRITZ HABER INSTITUT BERLIN	P6-FHBerlin	GERMANY
7	HUMBOLDT UNIVERSITY BERLIN	P7-HUBerlin	GERMANY
8	TU DRESDEN	P8-Dresden	GERMANY
9	UNIVERSITY OF NOTTINGHAM	P9-Nottingham	UNITED KINGDOM
10	JAGIELLONIAN UNIVERSITY KRAKOW	P10-Krakow	POLAND
11	IMRE A*STAR	P11-Singapore	SINGAPORE

Total budget: 9 642 K€

EU contribution: 6 899 K€

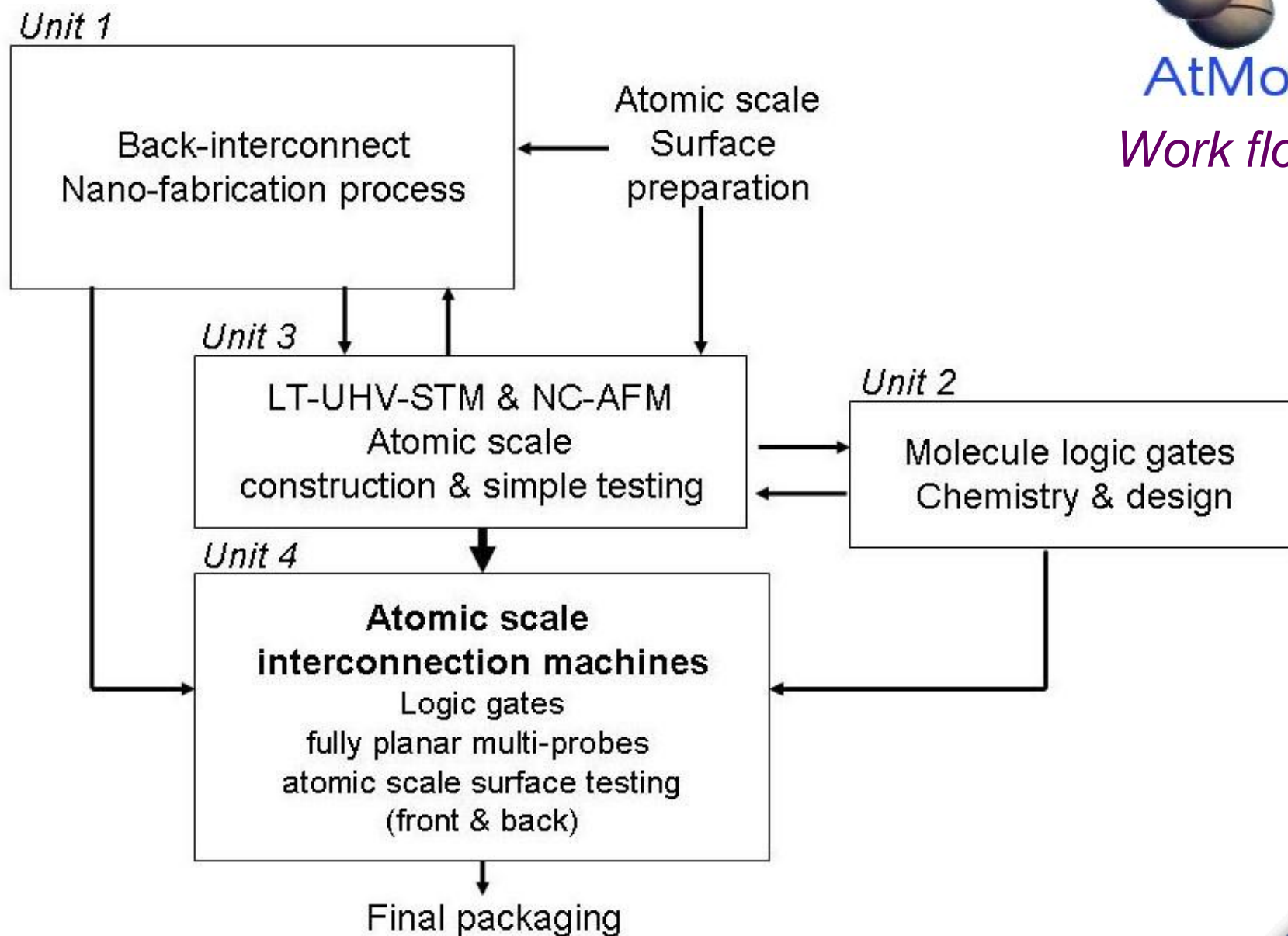






AtMol

Work flow



2011

Atomic Scale Interconnection Machines
(28-29 June 2011 IMRE Singapore)

2012

Architecture and Design of Surface Molecule Logic Gates and circuits
(12-13 January 2012, Barcelona)

2012

Imaging and manipulation of molecular orbitals
(Berlin, September 2012)

2013

Les Houches AtMol Winter School
(Selected by Les Houches committee for January 2013)

2013

NC-AFM images and manipulation of single atoms and molecules
(Nottingham, ? 2013)

2013

On-surface polymerisation & UHV transfer printing of single molecules
(Berlin, ?)





AtMol Workshop series - Singapore IMRE June 2011



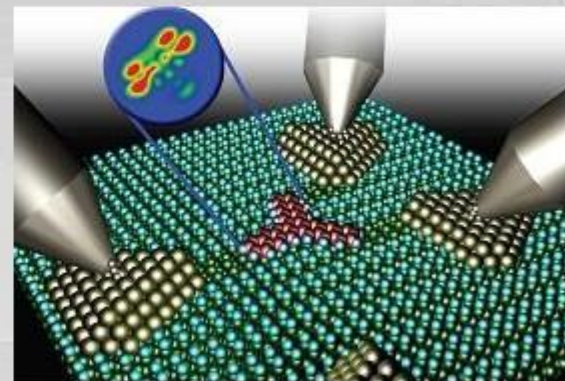
Advances in Atom and Single Molecule Machines

New book series

Advances in Atom and Single Molecule Machines is the first comprehensive series of books dealing specifically with single atom and molecule machines. Derived from a number of long-term European Commission Future and Emerging Technologies (FET) projects including AtMol, Elfos, Focus, Diamant and Artist, volumes in this series comprise topical reviews, lecture-course derived textbooks and re-worked proceedings of workshops.

Atom and single molecule machines are small! In fact, they are several orders of magnitude smaller in terms of quantum states than the macromolecular machines we are familiar with, such as weakly bonded molecular complexes or assemblies of proteins. These atomic scale machines are expected to be capable of calculating, memorising, communicating, measuring, rotating one way and even producing work or information stabilised alone atop a surface, or by a cold trap.

This series deals with the theory, design, construction, synthesis and the creation of technologies for a multi-channel transmission of energy, information or motion with and between single atom and molecule machines. The series also considers topics dealing with industrial applications such as molecular processors and memory, atom chips, nano-packaging, nano-interconnects and nano-communications.



Series Editor

Prof. Dr. Christian Joachim (CNRS)

Titles in Preparation

Atomic Scale Interconnection Machines

Proceedings of the 1st AtMol European Workshop Singapore 28th-29th June 2011

Ed. Christian Joachim

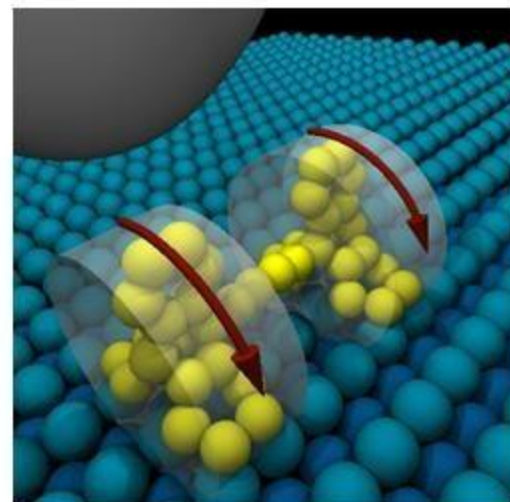
Architecture and Design of Surface Molecule Logic Gates and circuits

Proceedings of the 2nd AtMol European Workshop Barcelona 11th-12th January 2011

Ed. Nicolas Lorente

Atom Chips

Ed. Fedor Jelezko



We accept topical reviews, lecture-course derived textbooks and re-worked proceedings of workshops for this series if you would like to submit a proposal please contact

Prof. Dr. Christian Joachim
christian.joachim@cemes.fr or
Elizabeth Hawkins

elizabeth.hawkins@springer.com

Editorial board

L. Grill (Fritz-Haber-Institute Berlin), F. Jelezko (Uni. Ulm),
D. Martrou (CNRS, Toulouse), T. Nakayama (NIMS, Tsukuba)
G. Rapenne (Uni. Toulouse), F. Remacle (Uni. Liege),
K. Ohmori (Uni. Okazaki)

Volume 1

Advances in Atom & Single Molecule Machines

**Atomic Scale Interconnection Machine
AtMol Workshop
28-29 June 2011 IMRE Singapore**

M. Cardona and L. Ley Introduction

W. L. Schalch Theory of Photoemission:
Independent Particle Model

S. T. Manson The Calculation of Photoionization
Cross Sections: An Atomic View

D. A. Shirley Many-Electron and Final-State Effects:
Beyond the One-Electron Picture

G. K. Wertheim and P. H. Citrin Fermi Surface
Excitations in X-Ray Photoemission Line Shapes
from Metals

N. V. Smith Angular Dependent Photoemission



Springer-Verlag
Berlin Heidelberg New York

Volume 2

Advances in Atom & Single Molecule Machines

**Architecture and Design
Surface Molecule Logic Gates and circuits
AtMol Workshop
12-13 January 2012 CSIC Barcelona**

M. Cardona and L. Ley Introduction

W. L. Schalch Theory of Photoemission:
Independent Particle Model

S. T. Manson The Calculation of Photoionization
Cross Sections: An Atomic View

D. A. Shirley Many-Electron and Final-State Effects:
Beyond the One-Electron Picture

G. K. Wertheim and P. H. Citrin Fermi Surface
Excitations in X-Ray Photoemission Line Shapes
from Metals

N. V. Smith Angular Dependent Photoemission



Springer-Verlag
Berlin Heidelberg New York

Anne-Laure Allain

Allain@cemes.fr

2011
Atomic Scale Interconnection Machines
(28-29 June 2011 IMRE Singapore)



2012
Architecture and Design of Surface Molecule Logic Gates and circuits
(12-13 January 2012, Barcelona)

2012
Imaging and manipulation of molecular orbitals
(Berlin, September 2012)

2012
NC-AFM images and manipulation of single atoms and molecules
(Nottingham, December 2012)

2013
Les Houches AtMol Winter School
(Selected by Les Houches committee for January 2013)

2013
On-surface polymerisation & UHV transfer printing of single molecules
(Berlin, June 2013)



Architecture & Design of Molecule Logic Gates and Atom Circuits

AtMol International Workshop 2012
January 12-13 Barcelona-Spain

