



## CARBON BASED SMART SYSTEM FOR WIRELESS APPLICATION



Start Date : 01/09/12  
Project n° 318352

Duration : 36 months

Topic addressed : Very advanced nanoelectronic components: design, engineering, technology and manufacturability

### WORK PACKAGE 7 : Project management

#### DELIVERABLE D7.6

#### Minutes of the T0+24 meeting

Due date : T0+24

Submission date : T0+26

Lead contractor for this deliverable : TRT

Dissemination level : PU – Public



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### WORK PACKAGE 7: Project management

#### PARTNERS ORGANISATION APPROVAL

	Name	Function	Date	Signature
Prepared by:	S.Xavier	R&D Engineer	03/11/14	
Approved by:	Afshin Ziaei	Research Program Manager	04/11/14	

#### DISTRIBUTION LIST

QUANTITY	ORGANIZATION		NAMES
1 ex	Thales Research and Technology	TRT	Afshin ZIAEI
1 ex	Chalmers University of Technology	CHALMERS	Johan LIU
1 ex	Foundation for Research & Technology - Hellas	FORTH	George KONSTANDINIS
1 ex	Laboratoire d'Architecture et d'Analyse des Systèmes	CNRS-LAAS	George DELIGEORGIS
1 ex	Université Pierre et Marie Curie	UPMC	Charlotte TRIPON-CANSELIET
1 ex	National Research and Development Institute for Microtechnologies	IMT	Mircea DRAGOMAN
1 ex	Graphene Industries	GI	Peter BLAKE
1 ex	Thales Systèmes Aéroportés	TSA	Yves MANCUSO
1 ex	SHT Smart High-Tech AB	SHT	Yifeng FU
1 ex	Università politecnica delle Marche	UNIVPM	Luca PIERANTONI
1 ex	Linköping University	LiU	Rositsa YAKIMOVA
1 ex	Fundacio Privada Institute Catala de Nanotecnologia	ICN	Clivia SOTOMAYOR
1 ex	Tyndall-UCC	Tyndall	Mircea MODREANU

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## CHANGE RECORD SHEET

REVISION LETTER	DATE	PAGE NUMBER	DESCRIPTION
Template	07/2013	8	
V1	03/11/2014	11	Final version

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## 1 PARTICIPANTS


**Date:** 16<sup>th</sup> September 2014

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## 2 AGENDA

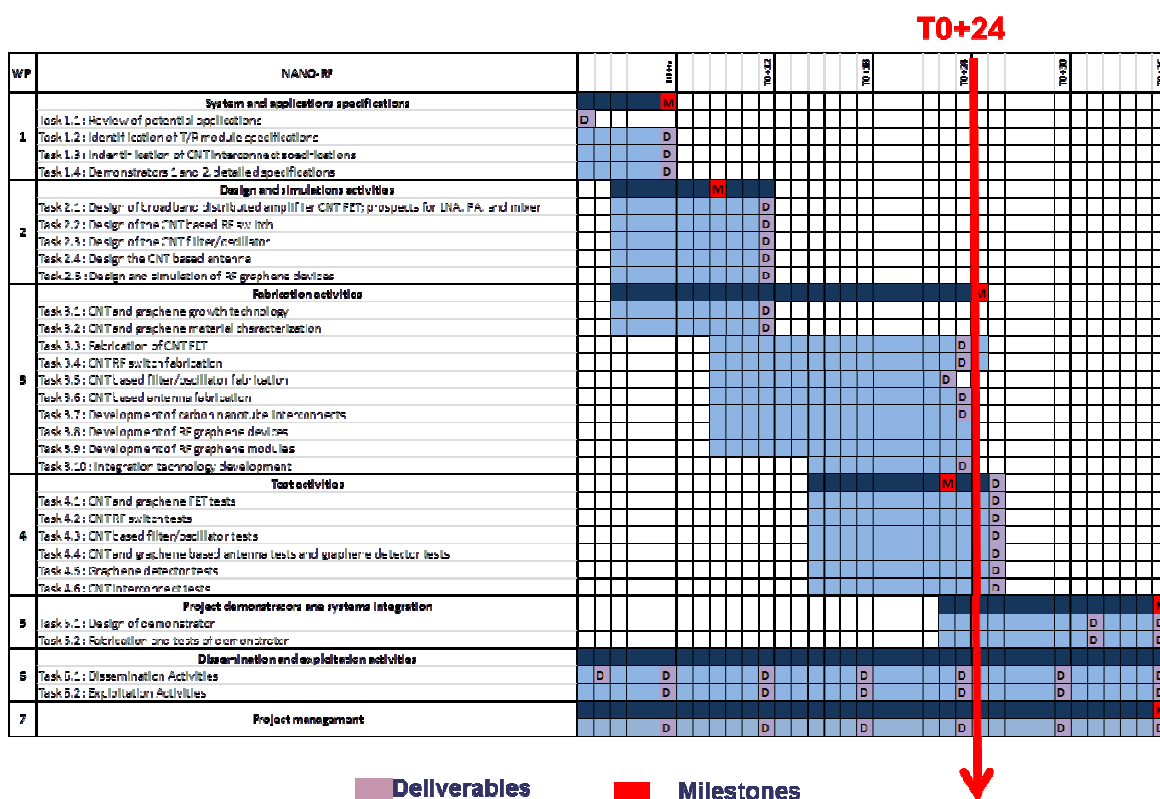
Tuesday 16th of September		
9:15	Opening, Welcome and Agenda	
9:30 – 10:15	<b>WP1 Presentations</b> <ul style="list-style-type: none"> <li>- Objectives &amp; means</li> <li>- Schedule of main milestones &amp; deliverables</li> <li>- Main results obtained on the period January-May 2014</li> </ul>	WP leader
10.15 – 11.00	<b>WP2 Presentations</b> <ul style="list-style-type: none"> <li>- Objectives &amp; means</li> <li>- Schedule of main milestones &amp; deliverables</li> <li>- Main results obtained on the period May-Sept. 2014</li> </ul>	WP leader
11:00 – 11:15	Coffe Break	
11:15 – 12:45	<b>WP3 Presentations Part-I</b> <ul style="list-style-type: none"> <li>- Objectives &amp; means</li> <li>- Schedule of main milestones &amp; deliverables</li> <li>- Main results obtained on the period May-Sept. 2014</li> </ul>	WP leader
13:00 – 14:30	Lunch	
14:30 – 15:30	<b>WP3 Presentations Part-II</b>	WP leader
15:30 – 15:45	Coffe Break	
15:45 – 16:30	<b>WP4 Presentations</b> <ul style="list-style-type: none"> <li>- Objectives &amp; means</li> <li>- Schedule of main milestones &amp; deliverables</li> <li>- Main results obtained on the period May-Sept. 2014</li> </ul>	WP leader
16:30 – 17:30	- Final discussion / Working groups/Conclusions	WP leader
20:00	Dinner	

All the presentations made during the Progress Meeting will be available as soon as possible on the website. We report here only the contents of the discussions that occurred during the presentations.

## 3 INTRODUCTION AND PROJECT OVERVIEW (A. ZIAEI, TRT)

Thanks to UNIVPM to receiving us in Ancona.

The project is at T0+24



### Next meeting:

- 2nd review meeting will take place in **Brussel (Belgium)**, on the **18<sup>th</sup> of November (9am-5pm)**. Meeting between partner for the presentation preparation will be held the 17/11/2014
- Next progress meeting (T0+30) will take place in **Heraklion (Greece)**, on the **22/01/2015 anuary (9am-6pm)**.

New project officer for the project : Mark Boukerche

Reviewers for the project are :

- Project Officer (EC) : Mark Boukerche
- Siebe Bouwstra (MEMS TC) & Dr Pirjo Pasanen (Spinverse Oy Ltd)

Next executive meeting (only with the WP leader) will take place in Brussels on the 29<sup>th</sup> october 2014

For the activity report we need from each partner one page to summarize your work for the last 6 month (T0+18 – T0+24) ==> **end of September 2014**

For the management report, we need you cost and PM ==> **end of September 2014**

For the e-newsletter, each partner must send few line to TRT to summarize his work (highlights for the first year of the project) ==> **end of September**

**Each partner have to send a list of publication for updating the Nano-RF website**

Discussion concerning project extension. All the partners are agree to request an project extension. We have to define the way to request an extension

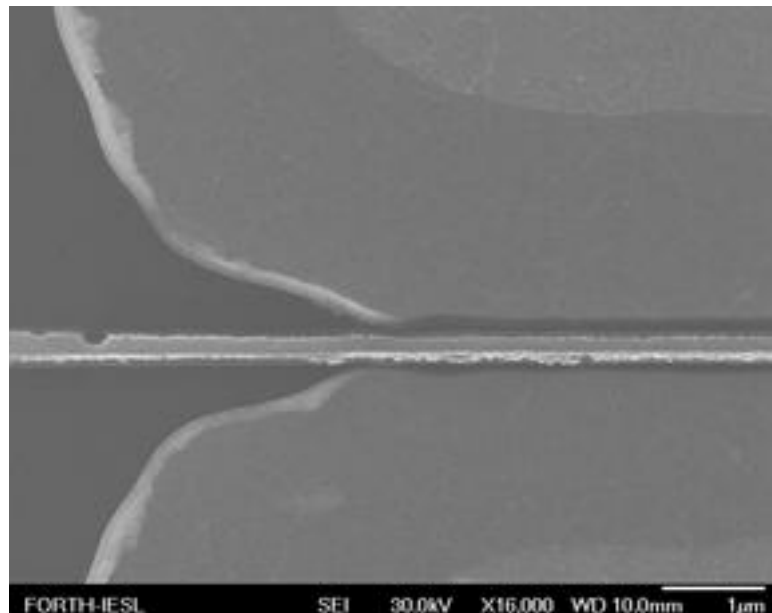
## 4 WP PRESENTATIONS

### 4.1 WP 2 (M.DRAGOMAN, IMT)

### 4.2 WP 3 (G. DELIGEORGIS, FORTH)

FORTH have presented the last result concerning the CNTs and Graphene FET (process optimization and electrical characterization)

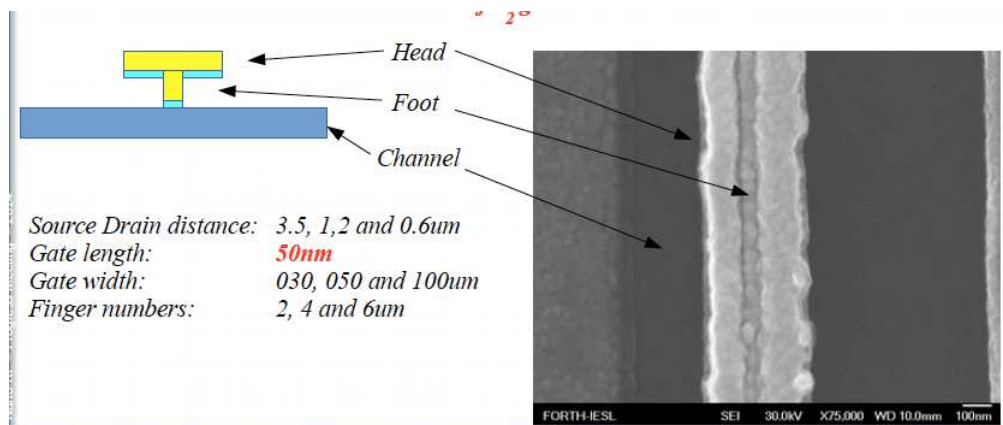
The distance Source-Drain is very important and need to be smaller than possible. Process using UV lithography was developed. Today, the distance SD is 0.6 $\mu$ m.



**Figure 1 : 0.2um gate aligned in a 0.6um S-D slot**

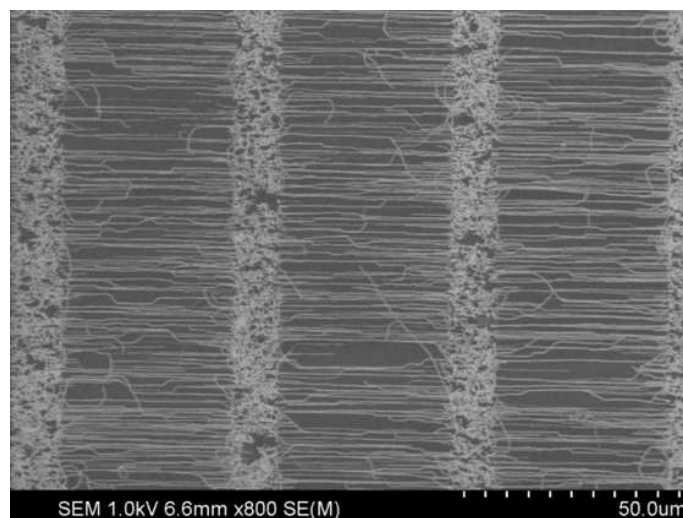
T-gate process was also developed by FORTH.





The next step is to fabricate device using HfO<sub>2</sub> layer to improve the performance of devices. Tyndall presented some improvement (deposition combine ebeam and ALD deposition).

SHT presented the latest result concerning the horizontally growth. The CNTs density is 7-8 tubes/ $\mu$ m. We can use this technology and try the CNT FET fabrication.



Liu have presented the latest result concerning the grapheme growth on SiC. The quality of the grapheme is very good. The first test on 2 inch wafer was also done. For the fabrication process optimization, the partner will use 10x10mm sample. For the module fabrication, we will use 20x20mm sample

TRT presented the list of WP3 deliverables. All the deliverables must be submitted before end of September.

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Del.	WP	Deliverable name	Delivery date	WP leader	Lead Beneficiary
D3.3	WP3	Activity report on fabrication of the filter/oscillator:	T0+23	FORTH	FORTH
D3.4	WP3	Activity report on fabrication of CNT based FET:	T0+24	FORTH	CHALMERS
D3.5	WP3	Activity report on fabrication of CNT based RF switch:	T0+24	FORTH	SHT
D3.6	WP3	Activity report on fabrication of the CN antenna, graphene antenna , and the RF graphene devices:	T0+24	FORTH	LAAS
D3.7	WP3	Activity report on fabrication of the CNT interconnects:	T0+24	FORTH	CHALMERS
D3.8	WP3	Report on the integration technologies:	T0+24	FORTH	FORTH
MS4	WP4	Performance specifications and extracted parameters for all sub-modules available	T0+23	LAAS	TRT

➤ **D3.3 : Activity report on fabrication of the CNT filter/oscillator**

- Lead beneficiary : FORTH
- Contribution : TRT (fabrication), IMT (Simulation & Design), SHT (CNTs growth)

➤ **D3.4: Activity report on fabrication of CNT based FET**

- Lead beneficiary : CHALMERS
- Contribution : FORTH (CNT FET fabrication), SHT/CHALMERS (Horizontally CNTs growth improvement)

➤ **D3.5 : Activity report on fabrication of CNT based RF switch**

- Lead beneficiary : SHT
- Contribution : TRT (fabrication), SHT (CNTs growth)

➤ **D3.6: Activity report on fabrication of the CNT antenna, graphene antenna , and the RF graphene devices**


- Lead beneficiary : LAAS
- Contribution : TRT (CNTs antenna), UPMC (CNTs antenna), FORTH (RF graphene devices fabrication), IMT (graphene antenna), Liu (graphene growth improvement), SHT (CNTs antenna, graphene growth improvement), GI (graphene growth improvement), Tyndall (dielectric deposition), ICN (graphene characterization)

➤ **D3.7: Activity report on fabrication of the CNT interconnects**

- Lead beneficiary : CHALMERS
- Contribution : CHALMERS/SHT (CNTs interconnects fabrication)

➤ **D3.8: Report on the integration technologies**

- Lead beneficiary : FORTH
- Contribution : FORTH,.....

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Action Plan for next week:

- Partner have to send all the contributions to G.Degloris (and S.Xavier) as soon as possible (deadline : 24/09/2014).
- ICN collect all the information about the characterization and send the document to G.Degloris as soon as possible
- D3.8 : Two ways are defined for the integration. LAAS is in charge of the part concerning the integration of module using wire bonding. FORTH write the part concerning the reverse process.

## 4.3 WP 6 (A. ZIAEI, TRT)

Publications can be uploaded and the bibliographic details entered.

All partners need to send few lines to summarize the work for the newsletters

## 4.4 WP 7 (A. ZIAEI, TRT)

For the activity report we need from each partner one page to summarize your work for the last 6 months ==> **end of September**

For the management report, we need your cost ==> **end of September**

# 5 REVIEW OF WORK & ACTION LIST

Description	Date	Leader
Two page for the activity report	End of September	TRT
Cost and PM for the management report	End of September	TRT
Few lines for the e-newsletter	End of September	TRT
Send list of publication/conference to TRT	End of September	TRT
SHT send sample with horizontal CNT to FORTH for processing	ASAP	SHT/FORTH
FORTH send sample with graphene layer to Tyndall for HfO <sub>2</sub> deposition test	ASAP	FORTH/Tyndall
SHT send sample with CVD graphene to FORTH and TRT for Raman characterization	ASAP	SHT/FORTH
Discussion LAAS/FORTH concerning graphene module	ASAP	FORTH/LAAS
Send contribution for WP3 deliverable	ASAP	ALL
D3.3, D3.4, D3.5, D3.6, D3.7, D3.8	End of September	IMT
D7.12, D7.18	End of September	TRT
D6.3, D6.5	End of September	TRT
Review meeting: Brussels, 18th November	November 2014	ALL
Executive meeting Brussels, 29 <sup>th</sup> October	October 2014	WP leader
Next progress meeting: FORTH, Heraklion 22 January 2015	January 2015	ALL