

First Advisory Board Meeting, Paris April, 3rd

Hydromel partners had the chance to have their first meeting with the members of the Advisory Board in Paris, after the 30 Months Technical Meeting General Assembly. The meeting was hosted by Alma in its brand new headquarters located in Gennviellers.

All the AB members were present: Andrea Reinhardt from MICROTEC (Germany), Luigi Occhipinti from ST Microelectronics (Italy), Davide Giaquinta from SORIN Biomedica (Italy), Alain Codourey from Asyrl (Switzerland) and Phil Keenan as independent expert.

Objective of the meeting has been mainly to analyse industrial relevance of Hydromel results and to investigate new business opportunities outside the consortium. in comparison with European and above all worldwide market. All the members of the board has a strong industrial oriented view being involved since many years in nano-manufacturing process chain with experience in US, Asia and Japan.

An open discussion followed the general presentation of Hydromel contents and started with the collection of the preliminary comments/impressions from the AB members after the first round of presentations.

Alain Codourey noted:” I can see interesting results in merging robot positioning + self assembly techniques, but further efforts are needed to integrate and finalise the progress made and keep the project always on the right way till the end.”

Andrea Reinhardt commented :”I’m very interested to Demo2 related to Tags Assembly. Tags assembly market can be a great opportunity for Hydromel results and the Hydromel approach is quite challenging. I recommend a strong industrially oriented approach in designing orientation techniques, because tags orientation is the key – issue to face successfully this market”.

Luigi Occhipinti (ST MICROELECTRONICS) continued saying that” I’m deeply impressed by the huge number of activities and demos, of which some are very close to market exploitation, some are exploitable in the longer term. In the first case some more efforts in benchmarking are needed, such as in the case of RFID fluidic assembly, where could be very useful to get more information about cost analysis and throughput. In the second case, longer term exploitation, more fundamental research is needed in DEMO4, where the project covers a wide range of technologies. Anyway I think that overall the project is well organised and structured.”

Davide Giaquinta was then called to give his comments:”I’m very impressed by possibilities related to performance of some activities and in particular I was struck by throughput achieved in DEMO 3. Important features are also manufacturing time, profitability of the company and this should be also taken into consideration. I would suggest a comparison in DEMO3 with other running projects on the same topic”.

The first round of comments was concluded by **Phil Keenan**:”I was formerly employed in my past carrier in IBM corporation and Hewlett Packard and several times I had to face the problem of assembly. Here the critical issue is that the market is not ready yet to integrate self assembly technologies, because components are not designed for them. Anyway I think that the challenge in DEMO2 is quite stimulating and risk in terms of scalability of process at industrial scale should be carefully evaluated. In general I think that the project is impressive for the high level of expertise and technologies brought together”.

After this preliminary collection of comments the discussion started with specific technical questions to the AB members:

First Question. Alexander Steinecker (CSEM):”Which Hydromel demonstrator will you choose and why?”

Alan Codourey replies first:

"I think that all of them are good, but for my "robot background" I would prefer DEMO1 dealing more with robot positioning. Moreover today from HUT presentation of DEMO2 I had the impression that self – assembly is slow".

Veiko Sariola (HUT) makes an advice:

"Yes, this can be the impression, but it's true that we can choose how slow the process can be: from 5 to 30 ms. This is the only case. Once self-assembly happens you don't need to check anything else and speed is not anymore a main issue)."

Alexander Steinecker (CSEM) adds:

"It must be also said that components positioning have at present accuracy of 100 micron and with HUT process it can be reached an accuracy twice the production ones"

Alain Codourey replied:

"In self - assembly you need to functionalise the components, the surface and to change the shape. A question for you Veikko: can we define some more rules on how to design components with which you can use self assembly in effective way? Another question: regarding orientation, if the components are very small, orientation is difficult, if they are bigger it's better".

Veiko Sariola (HUT) replied:

"My reply to the first question is that it's difficult to define these kind of rules within the end of the project, but since we are joining robot + self - assembly we can relax requirements, because you can compensate benefit/defects of the two techniques. Second question: at nanoscale forces playing are difficult to be evaluated, but we are dealing with this problem and we will have some answers before the end of the project".

Alexander Steinecker (CSEM) added a second question to HUT:

"Regarding position accuracy: after deposition you can have stochastic shifts not happening in robot positioning. Can self assembly cope with this?"

Veiko Sariola (HUT) replied:

"There are not experimental background to answer to this question. Anyway it is true that after water drying the tags does not move, there are test proving it".

Next member replying to the first question is Andrea Reinhardt from Microtec:"

"If I have to choose among the different demos I will give first priority to DEMO4 related to organisation of nanowires, for long term applications such as displays in the future. In this demo a lot of technologies and applications are covered, I would strongly recommend to focus only on one application and take it till the end. I would give second priority to DEMO3 that it's very close to direct industrial application. For DEMO2 on self-assembly: this is very interesting but I think that there are still a lot of things to do before having it in real industrial applications. More accuracy is needed, the reality is that you have quite stressing difference in chips shapes, they have not always the same size and it's clear that self – assembly is directly influenced by size. So I see as main problem for industrialisation that in self- assembly are needed highly equal parts to be assembled and this is against the actual market offer".

Alan O'Riordan from TYNDALL, responsible for DEMO4, gives his comments about expectation in DEMO4:

"Self – assembly needs to be scaled down (photonic led mems requires 5 micron), aligning molecules in nanowire to have luminescence/fluorescence effects is done in very brief way studying

rotation, emission and control positioning of the nanowires. So as possible application for the futures I can see large exploitation of nanowires in diodes, but here we need to enhance density of the nanowires. Self assembly can be used to increase both density and emission. Other possible applications can be sensors (photonics) and super - electrodes. I fully accept your point to look only for 1 application in DEMO4 and this is the way we are following”.

Next member replying to the first question is Luigi Occhipinti from ST Microelectronics:

“All the demos are quite interesting, but for my personal background and working experience I would chose DEMO2: rfid tags assembly. I would recommend partners involved in this demo to benchmark the cost, because this is a typical sector of low-cost high volume production. ST was producing this kind of product, then suddenly market demands reduced the cost below 3 cent/tag, so at the time the company was able to apply an immediate contingency plan starting a project on polymeric electronics (not applicable to gigahertz), but capable to achieve the cost goal imposed by the market. Please remember that driving force here is: COST. I can say that ST patented polymers for this reason. There are of course limitations. Potentials for combining robot positioning + self – assembly are high, but you can enter the market only if you reach exactly the market demands. The main point is economic efficiency. If you don’t reach the market demands, you fail even if the technology is the best in the world.”

Alexander Steinecker (CSEM) commented:

”We also consider cost as a key – issue and we have in the project a running activity about design of most cost effective processes led by the Italian partner HEXACOM. The aim of this task is really to analyse each demos from the cost feasibility point of view and to provide input about the more cost efficient solutions. Moreover, I would like to underline, in addition to Luigi’s considerations, that the European Technology Platform EPOS produced a Strategic Research Agenda with roadmaps indicating that RFID self – assembly can be considered as a key – technology for the future and for this reason will be supported as strategic research goals in future calls for funding projects”.

Next member replying to the first question is Davide Giaquinta from SORIN:

”I agree with the other members in saying that all the demonstrators presented are very appealing and with technical level. Talking from an industrial point of view, in relation to my company needs, I would like to be involved in the development of an application with a short term return for SORIN, such as the equipment related to cells manipulation in DEMO3. If I should regards to a long term application, the interest of my company could fall on nano-wire technologies developed in DEMO4, taking into account that SORIN is a biomedical company and we’re living in a digital world, there is a growing interest also for application in bio-equipment development”.

Next member replying to the first question is Phil Keenan:

“I’m very interested to DEMO2, too. Let me say that in an ideal world we won’t need self – assembly. Semiconductor technology did a lot for wafer production, so the real focus is the self precision alignment. The problem is that there is no a die at the state of the art that can accept self - assembly. We need to design this kind of die, it does not exist now. I think that all the elements to make self – assembly efficient can be found in the Hydromel project, but the ultimated gaol to make industrialisation efficient is the design for a proper die”.

Second question. Alexander Steinecker (CSEM):”Which is your motivation to join the Advisory Board and which are your expectations from this collaboration?”

Phil Keenan:

”I like my work and I have always been attracted by ambitious goals, but I did not have time to see my challenge realised. I faced with self – assembly in semiconductor industry, but when I left I could not see the output of my investment in terms of application scale up and return of investment.

It was too early. I consider Hydromel a new opportunity to give a look at the latest state of the art in this world and to give my contribution to face this challenge”

Davide Giaquinta:

“I’m convinced that you cannot grow up if you stay closed in your office and in your own world. The only way to have new business opportunities, to be aware of what other companies are doing and of new potential technologies arising is to take chances like the Hydromel project offered with the organisation of these Advisory Board meetings ”.

Luigi Occhipinti:”ST first motivation is always to keep an eye over new potential applications arising from micro – nano technology world. To face the global crisis we all need, and I’m referring to both industry and research world, a constant efforts in innovation. In these times you cannot do it without multidisciplinary and integration. This is what I found in this project at the highest level and this makes Hydromel one of the most interesting project I have ever seen”.

Alain Codourey:

”As you remember I was formerly involved in Hydromel project before leaving CSEM, so I was very curious to see what was going on after two years. Another reason is that I’m still working in micro – assembly and I have a lot of interest in knowing the prospective for the future about what’s going on with hybrid technologies”.

Andrea Reinhardt:

” I am curious, I’m involved in MINAM Association and in scientific team of evaluation of the commission. So my experience is that it’s always better to have direct contacts with running projects. Some time ago we had a call by Rolex, a contact we tried, because they were interested to micro – fluidic self –assembly developed in Hydromel. Rolex moves very slowly, we will see in the future what happens. Anyway this first trial showed that it’s not difficult to bring good results out of the project, but it’s very important that partner goes out and make know to the external world what they are doing”.

Alexander Steinecker added a question for Andrea Reinhardt:

”Andrea, since you are involved in MINAM I think it would be of interest for all the Hydromel partners to know which is the current status and tendencies in the preparation of the future new funding calls in NMP and IST?”

Andrea Reinhardt replied:

”Framework programme coming are not modifiable. Self assembly and molecular manufacturing will be still inside because there is need for cost reduction, together also with classic robot approach. I recommend you to give a look at MINAM roadmaps that you can download from MINAM web-site. I think that integration of technologies will be more and more a key issue in the future and this makes Hydromel a project of strategic importance for which can be identified plenty of funding possibilities”.

Third question. Maddalena Rostagno (DIAD):”Since you represent industry, it would be interesting to know for all the Hydromel partners your view about future market perspectives, in particular how do you think European companies can face the competition with Asia?”

Andrea Reinhardt:

”Asian companies use a lot of public money to survive, they are not competitive for low cost efficiency. Europe has incomparable knowledge, we can use better ideas, but this also means that

we need to be very specialised. We only need to be faster in adopting the market needs, as Asia is able to do. Silicon manufacturing has a very high consumption of energy and future factory needs to be energy efficient, it's the only way. At the moment there is a lack for flexible production".

Luigi Occhipinti:

"As far as concern the semiconductor industry there is a lot of demands coming from the eastern country, in particularly China region is critical. Europe is still at the cutting edge of technology in R&D, but cost effectiveness is not competitive: lower energy cost, salaries, higher yields makes Asia semiconductor industry more aggressive. Innovation is driven by Europe and the Return of Investment is strictly related to the capability to introduce in the markets innovative products and this is the strength of Europe"

Phil Keenan:"It's a reality that cost benefit is driving Asia and that also for European companies is much more cheaper to make assemble components by hands in Asia"

Fourth question. Maddalena Rostagno (DIAD):"How do you see the role of European SME involved in micro – nano electronic in this global context?"

Luigi Occhipinti:

"I think that the actual situation is not really influenced by the global crisis, but it is true that market requests are deeply changed. Skills and expertise are not yet excellent in Asia and a key-winning factor for European SMEs remains innovation"

Alain Codourey:

"In my experience I saw that the key to survive in Europe for a SME is to keep mass production here. We are passing through a dangerous situation: if a SME has good ideas it risks to loose them because big players take them away and realise them in Asia. The former company in which I was involved was bought by a big US OEM, even if we had an excellent portfolio of products, the US owner decided to start production in Asia".

Fifth question. Alexander Steinecker (CSEM):"Alan statement makes clear the importance of the following problem for a company/institutions: is it better to patent or to keep knowledge secret?"

Phil Keenan:"I think that patent it's a case by case decision, but if you go for a patent you need to be well protected worldwide and you also need a local office to check".

Andrea Reinhardt:"Competitors from US can go in Russia to patent. If you want to hide your patents, I suggest to use weird crazy titles so nobody can recognize the idea behind it"

Alain Codourey:"When you have a patent and big group comes, it's very difficult to defend yourself. My philosophy and suggestion is not to patent and bring the idea very fast to the market".

Sixth question. Alan O'Riordan from Tyndall:" Do you have any hints about the best way to transfer new advanced technologies from RTD to industry?"

Luigi Occhipinti:" Academic partners wants to publish, that's correct. On the other hand, to improve the exploitation potential a kind of end users group could be started: this should be done in the project as a kind of open network. The end users group should define roadmaps about how to go from RTD to industrial application, not only in the consortium but also outside."

Alexander Steinecker: "Roadmapping is one of the activities of the project and this is taken as a very serious task in order to constantly compare what it's currently done in Hydromel with competitors outside the consortium".

Andrea Reinhardt: "Cooperative research is important, but a possible hint could be to think about more exchange of people from companies to universities and institutions: this could give you a direct feedback about what's going on."

Phil Keenan: "My suggestion to understand what customers really want is to ask them very simple and direct questions based on the capability of what you want to achieve and on your needs."

To conclude, Alexander Steinecker asked: "Which is your final advice to the project?"

Phil Keenan: "Keep developing and disseminating as you are doing now, this is the future"

Davide Giaquinta: "To share more knowledge with the outside world and to give more evidence on the final real benefits for industry"

Luigi Occhipinti: "Keep challenging and comparing with existing technology"

Andrea Reinhardt: "Makes results more easily accessible and put them on the public web site, making very clear who are the customer groups you want to achieve"

Alain Codourey: "Very important is to have benchmark, that means not what it is the state of the art, but above all what I bring that it's better with respect to state of the art"