THEME 3 : Substitutive and alternative materials for competitiveness

23 June - 10h40 / 12h40

WORKSHOP 1 : MATERIAL BREAKTHROUGHS 2050

This workshop will cover the following themes :

- From "either or" to "and and" : materials breakthroughs that can solve two problems that appear contradictory (e.g passive safety AND lightweighting of vehicles or guided regenerative medicine AND biomaterials inside the body).

- Acceleration of research : bridge between industrial sectors in order to speed up progress (e.g of one discovery 10 years ago together with one discovery 10 years later that suddenly makes it possible for nano materials design to solve one paradigm: zeolites discovered and 10 years later made microporous that can suddenly incorporate copper and make a Denox solution for diesel engines efficient and stable) and cooperation between academia and industry (both major groups and start ups) where simulation has brought breakthrough results (cooperation between EPFL and Bosch or IBM to find alternative to silicium) or where piezzotech capability can make product both smart and flexible (cooperation between Piezzotech and Arjo and a Dutch start up in the field of secured documents).

- Special attention to human factors (e.g engineers, biologists, surgeons and IT specialists working together in order to understand, adpt and replicate natural processes into artificial ones).

Reading materials :

> Materials Breakthroughs for 2050.pdf

> Horizon 2020.pdf (European Commission)

> McKinsey : Are you ready for a resource revolution.pdf

23 June - 14h30 / 16h30

WORKSHOP 2 : COMPOSITES

This workshop will cover the current trends of polymer composites identified as the fastest growing family - vs. metal based or ceramic based composites :

- The move from a 1st generation of composites mostly thermoset (TS) focused on defense/aeronautics and on light weighting to a 2nd generation of composites (with TS and even more so Thermoplastics - TP) more focused on higher/tunable mechanical performance (impact, fatigue resistance, no corrosion) and on reduced costs (polymer chemical composition, part design, semi product process engineering) with a wider range of applications (sport, offshore energy, building, automotive). With a focus on the experience learnt from extremely demanding defense applications that could be useful for commercial applications. And at the other end a focus on sport applications seen as a new field to experiment extreme and/or tunable mechanical performance.

- Facing some difficult hurdles : the necessary changes in equipment to move from TS to TP (or to manufacture them both), a limited number of global suppliers, a fragmented value chain (polymers suppliers, composites designers, equipment manufacturers, final applications actors), the access to low cost carbon fibers, and a question mark on the recycling. With a specific focus on performance tracking modeling throughout the value chain.

- With the perspective of a 3rd generation of polymer composites is underway with new challenges to face : the incorporation of new functionalities (such as actuators or sensors to make them "stimuli responsive"), the "structuring" of the value chain (including possible new entrants), more flexible manufacturing processes & the "industrialization" of recycling.

Reading materials :

> Composites.pdf

> 18 Companies rewarded for JEC Europe 2015 Innovation Awards

> McKinsey : Are you ready for a resource revolution.pdf

24 June - 08h00 / 10h00

WORKSHOP 3 : SUSTAINABLE COMPETITIVENESS

During this workshop, we will move away from "Continuous Improvement only" towards "breakthroughs projects" that all have in common to improve the value proposition for customers (making it "more green" but also "higher quality") and to increase the competitiveness of companies providing the related products or services :

- All digital projects that support better allocation of resources and allow for deleting unnecessary production or development steps and costs (such as simulation softwares to simplify trial protocols or automated trucks on iron ore mines or remote control for white room located GMP pharmaceutical processes).

- Use of multi skilled research or engineering teams in order to unlock specialists' boundaries and speed up the development of these "win win" new materials or breakthrough technologies (such as aircraft parts that embed electrical conductivity or use of automation engineering to better align/monitor production flows resulting in continuous casting of metals).

- Materials or technologies initially developed for one purpose and that are now used to serve multi purposes (such as extrusion initially developed for food and now a breakthrough process for pharma while lowering the scrap rates of extremely expensive APIs or recycling of thermoplastic composites based on a concept initially developed for recycling multi layers food packaging).

- Altogether this not about "either Sustainable Development or Competitiveness" but rather a "and and approach" (the Aluminium Stewardship Inititiative goes together with the Ford pick up or the Tesla chassis in Aluminium) & communication is required to foster positive results achieved by both large companies and SMEs in achieving sustainable competitiveness.

Reading materials :

> Alternative Materials for Competitiveness.pdf

> Assessing Progress toward Sustainable Competitiveness

> McKinsey : Are you ready for a resource revolution.pdf