Katarzyna Majchrzycka, Ph.D.

Head of the Personal Protective Equipment Department , CIOP-PIB, PL

NEW TECHNOLOGIES and SMART SOLUTIONS for OCCUPATIONAL SAFETY and HEALTH (examples)

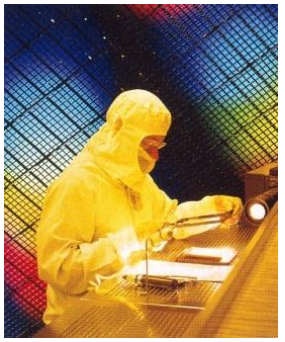
Strengthening OSH knowledge and innovation as a driver of EU smart growth

7 November 2011, Warsaw

Key idea: innovations concerning occupational safety and health should be aimed at meeting up to global social and economic needs

OUTLINE

- ✓ Global trends related to safety and health
- ✓ Technology trends
- ✓ Examples of recently developed solutions
- ✓ Benefits & needs



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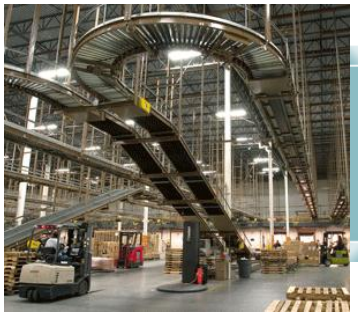

Global key trends

(OSH-related)

- **Globalization of production and specialization of industrial work with increased automatization of industrial processes, growth of semi-industrial work (e.g. utilities, maintenance, services)**

- **Global mobility of people – faster spread of pandemics and animal diseases transmittable to humans**

- **Networking – contacts between many workers are no longer regulated with face to face but by social media and virtual connections**

- **Climate change and natural disasters – more unexpected incidents need:**
  - **greater protection for rescue teams**
  - **reduction of damage to environment**

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TRENDS IN TECHNOLOGY (1/2)

- **Integration of state of the art materials, components and ICT solutions to be used in environmental awareness, monitoring of physiological parameters, reporting, interaction with tools in order to improve task performance, traceability of exposure, integrity and maintenance**

- **Development of adaptive materials and systems allowing to adjust the range of protection parameters of the devices to the changeable conditions of a workplace in order to optimize the balance between protection and task performance or between protection and comfort**

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TRENDS IN TECHNOLOGY(2/2)

- **Sustainable materials:**
  - **biopolymers (e.g. disposable materials)**
  - **extending the life-time of safety devices by recharging products (this could be done by adding tracers, RFID tags and service indicators) to ensure safety of the environment**

- **Product customisation based on product design concepts to respond to users' individual functionality and aesthetics, especially with regard to workers with specific conditions and for self -employed workers or small companies**

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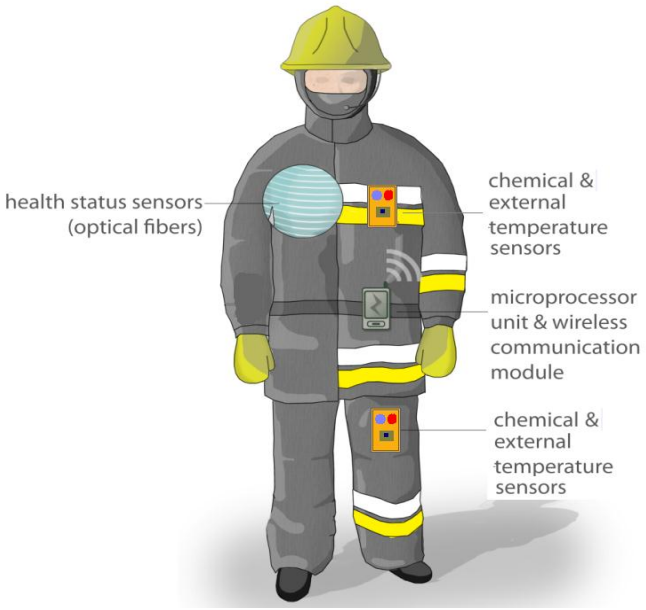
EXAMPLES OF RECENTLY DEVELOPED SOLUTIONS (1/6)

i-PROTECT: INTELLIGENT PPE SYSTEM FOR PERSONNEL IN HIGH-RISK AND COMPLEX ENVIRONMENTS

i-Protect

Project Coordinator: CIOP-PIB, POLAND
Start date: 1st October 2009



HEALTH AND SAFETY

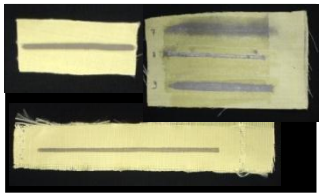
- Monitoring of environmental hazards
- Monitoring of health status
- Ergonomics

INFORMATION AND COMMUNICATIONS TECHNOLOGIES

- Microsensors
- Wireless communication network
- Visualization of data

NANOTECHNOLOGY

- Anti-electrostatic fabrics
- Gas sensors
- Nanostructured conductive paths



SEVENTH FRAMEWORK PROGRAMME

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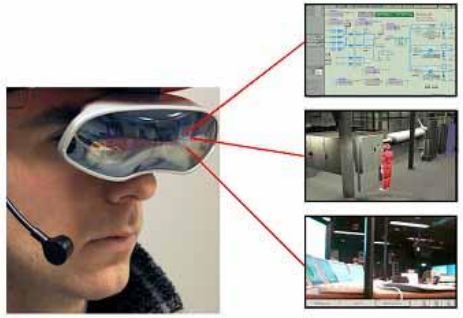
EXAMPLES OF RECENTLY DEVELOPED SOLUTIONS (2/6)

AUGMENTED REALITY – SUPPORT SAFETY SYSTEMS



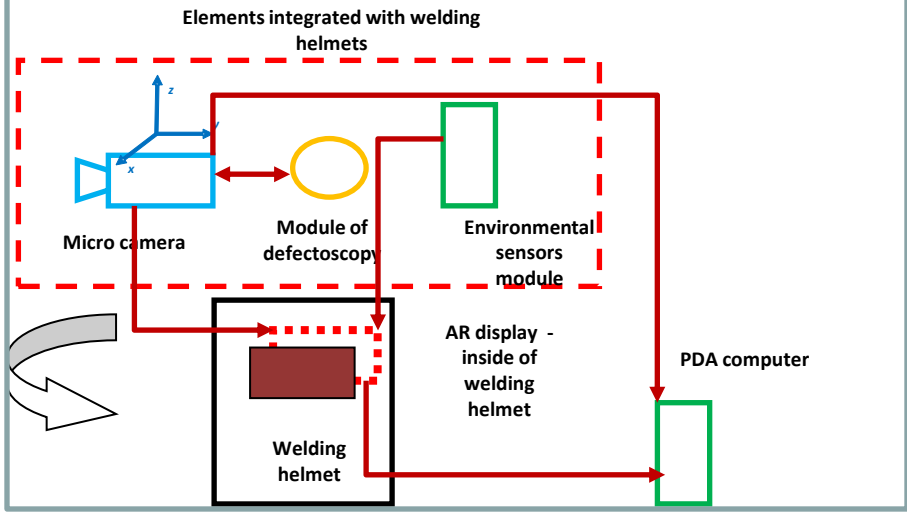
Systems of augmented reality allow to put additional pictures or signs in the field of view of workers to:

- ✓Improve people's safety
- ✓Enhance ability to provide additional visual information

End-users and application:

- ❑ Electricians (e.g. schemes of electrical installation)
- ❑ Assembly workers (e.g. additional assembly instruction)
- ❑ Surgeons – (e.g. physiological parameters of patients)
- ❑ Drivers (additional information on road sings, traffic jams, etc.)

Improve safety of welders by augmented reality system embedded with welding helmet



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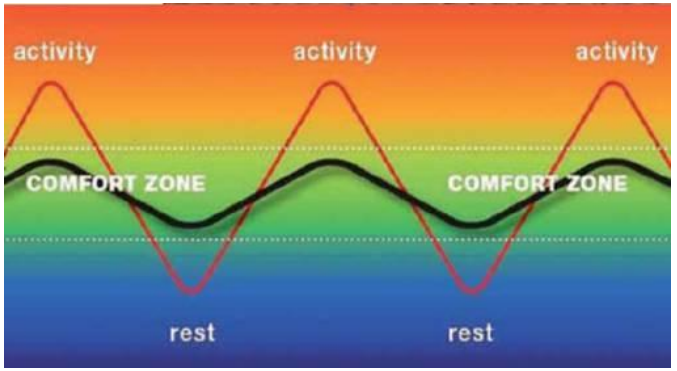
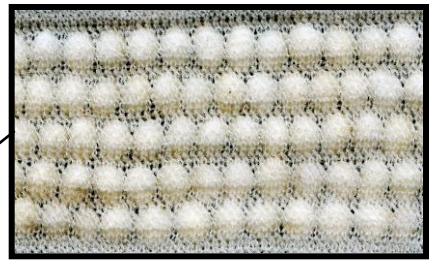
EXAMPLES OF RECENTLY DEVELOPED SOLUTIONS (3/6)

THERMOREGULATIVE GARMENT WITH PCM FOR USE UNDER PROTECTIVE CLOTHING

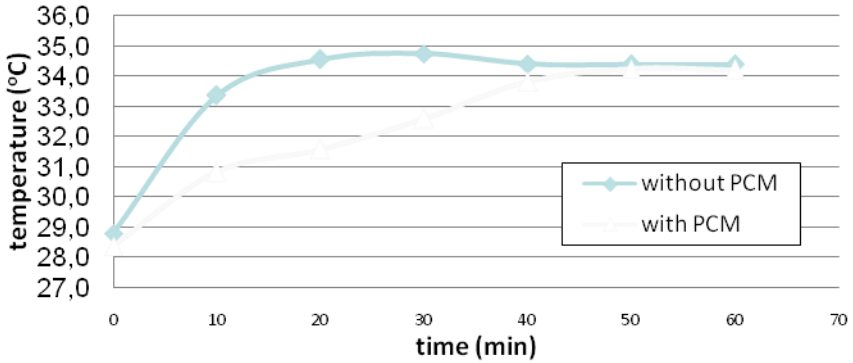
Phase Change Materials (PCM) can absorb, store and release certain amount of heat in specific temperature range.





Patent Application **No. P-396551**

Temperature under the underwear



Unique construction – PCM macrocapsules introduced to the channels of the knitted farbic

Garment enthalpy 154 J/g (**98** kJ)

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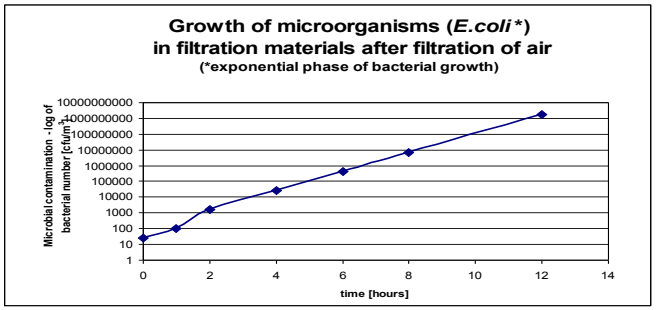
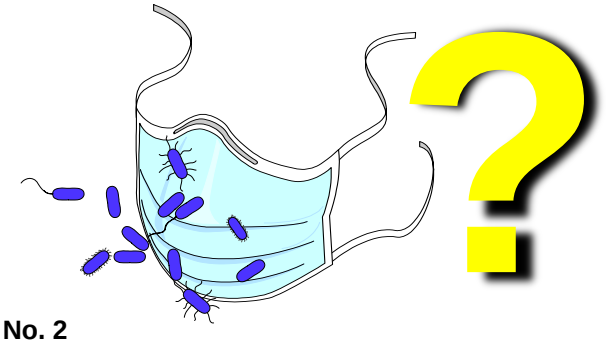
EXAMPLES OF RECENTLY DEVELOPED SOLUTIONS (4/6)

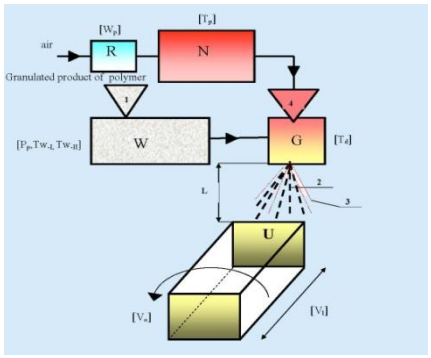
BIOACTIVE & BIODEGRADABLE RESPIRATORY PROTECTIVE DEVICES

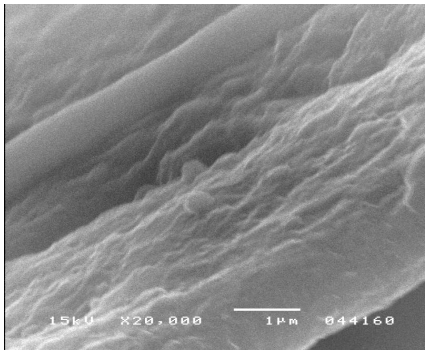
should ensure appropriate efficiency in absorbing microorganisms but also should not be a source of infection and safe for the environment





Source: Majchrzycka K., Gutarowska B., Brochocka A., JOSE 2010, Vol. 16, No. 2





Using meltblowing and spunbonding nonwoven process and low temperature plasma treatment for creation of modern materials

Source: Domagała W., Wrzosek H., Szymanowski H., Majchrzycka K., Brochocka A., Fibres & Textiles In Eastern Europe 2010; Vol. 18, No 6(83)

Using biodegradable polymers (e.g. Poly(lactic) acid (PLA)

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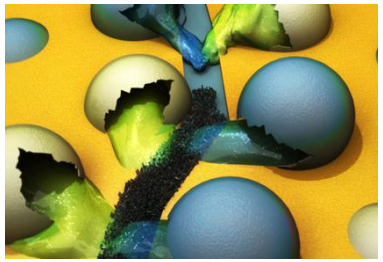
EXAMPLES OF RECENTLY DEVELOPED SOLUTIONS (5/6)

SIGNALIZATION OF CHEMICALS PERMEATION THROUGH PROTECTIVE GLOVES



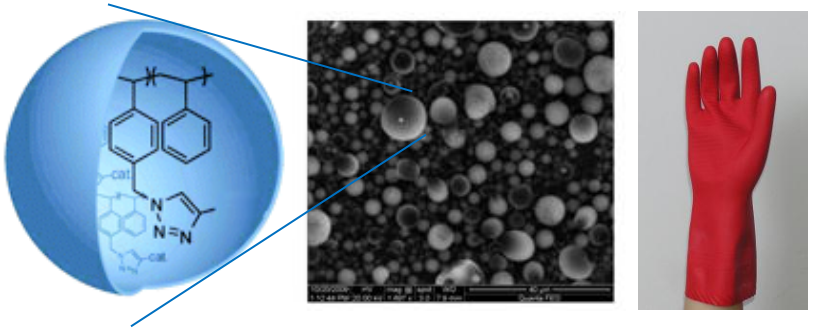
For signalization of acids and bases, indicating pigments can be used. It is possible to select pigments which change their colours at a required level

for bases and organic / inorganic acids

10 % HCl

80 % CH_3COOH

1M NaOH



Source: *Handbook of Occupational Safety and Health*, ed. by D. Koradecka

For signalization system microcapsules can be used

The indicating system gives a clear signal for workers that gloves do not provide protection anymore and should be immediately withdrawn from use

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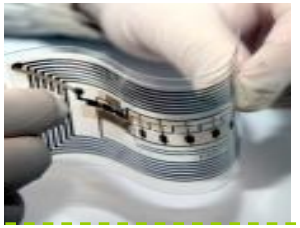
EXAMPLES OF RECENTLY DEVELOPED SOLUTIONS (6/6)

AUTOMATIC IDENTIFICATION SYSTEM TO MONITOR TIME OF PPE USE

PPE + tag

software + database

active tag



passive tag

- **Controlling and supervising PPE parameters during work day**
- **Storing data on PPE "life cycle"**
- **Long – term monitoring of PPE "life cycle" focusing on the economic aspect**
- **Statistics and planning of the spendings**

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INNOVATION BENEFITS

(OSH-related)

- Reduction of occupational hazards and risks
- Benefits to society by protecting human health and natural environment
- Economic growth through introduction of new technologies
- International competitiveness through enhanced productivity and innovativeness
- Transfer of knowledge and technology into marketable products and services
- Networking with other researchers, industries and other stakeholders

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NEEDS TO DEVELOP INNOVATIVE SOLUTIONS

(OSH-related)

- **Reduce time to market and increase in market shares**
- **Ensure better normative solutions and support mechanisms in form of pre-normative research in order to transform new developments into marketable products**
- **Increase in acceptance of innovations among customers and public procurers**
- **Innovation processes require involvement of industries and end users**

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CONCLUSIONS

- Health and safety innovation are crucial to ensure the well- being of European workers

- They are key elements for competitiveness, considering the high costs related to workplace accidents and occupational diseases

- Research should reinforce European leadership in terms of quality and innovation of OSH products and systems

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Thank you for your attention

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