6th Framework Program in Hungary

Share of NanoMatProd

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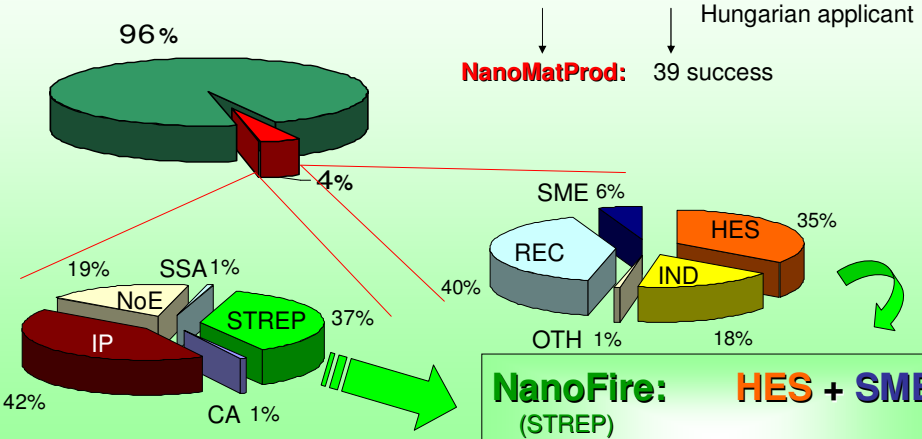
Wien 14. 11. 2006

6th Framework Program in Hungary

Share of NanoMatProd

In 6th FRP: 850 successful Hungarian applicant

NanoMatProd: 39 success



NanoFire: HES + SME (STREP)

MultiHybrids: HES + SME (IP)

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Nanofire

Environmentally friendly multifunctional **fire retardant** polymer hybrids and **nanocomposites**

Nanocomposites, Fire safety, Control

Hungarian contribution

BUTE, PEMU

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NanoFire: Environmentally friendly multifunctional fire retardant polymer hybrids and nanocomposite

Aims To increase fire safety in transportation by using nanofillers

To decreade weight, fuel consumption, increase performance

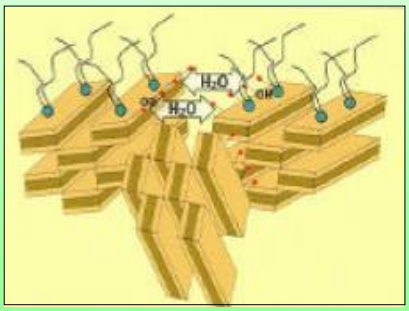
Partners

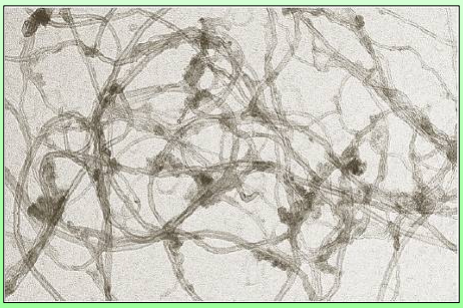
CDCMP	Coorinator SME I
Università di Perugia	Physics I
University of London	Polymer techn GB
University of Piemonte Orientale	Synthesis I
University of Budapest	Interfaces H
Nanocyl S.A.	Nanotubes B
Materia Nova	Nanohybrides B
Leistritz	Equipment producer G
Tolsa	Nanowishkers S
CR-Fiat	Car producer I
PEMU Car Accessories Ltd	Polymer processing H
IPM	Sensor producer I
INSA-Lyon	Composites F

Synthesis of nanosructures

MATERIALS - KNOWLEDGE from WP1 and WP2

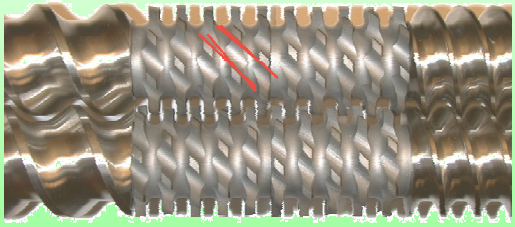
Compatibility: surface modification on MWCNT, Sepiolite, POSS
Catalytic metal ions in modified Sepiolite, POSS, MWCNT,
Combination of different nanofillers

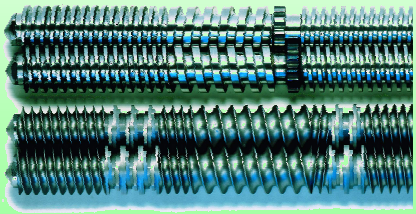




Nanocomposite formation

Continuous process
requires special
Extruder
and
Screw system



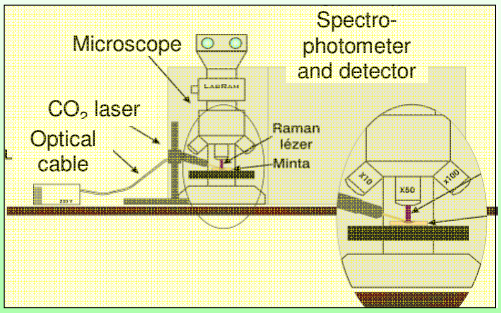


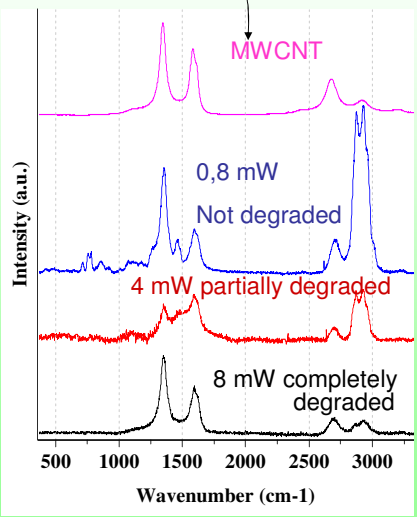
Leistritz

Analysis of nanosructures

Methodologies WP4: Hungarian contribution

New LARaman method for fire resistance-simulation





Interfacial studies WP3

Leader BUTE (H)

Alms:

In the Contract:

- The changes of the surface structure of nanosilicates, POSS and nanotubes
- Influence on the final FR and mech. performance
  to be clarified by analytical methods and modelling
- Advanced surface modifications of FR polymers to be developed
  improvement in durability, appearance and adhesion

Additional:

- Understanding the role of surface/interface in the FR mechanism and thus
- Promote FR modelling

Task 3.1. Surface analysis + (molecular dynamics) modelling
Task 3.2. Intrface modification
Task 3.3. Modification of the surface effects on automotive parts

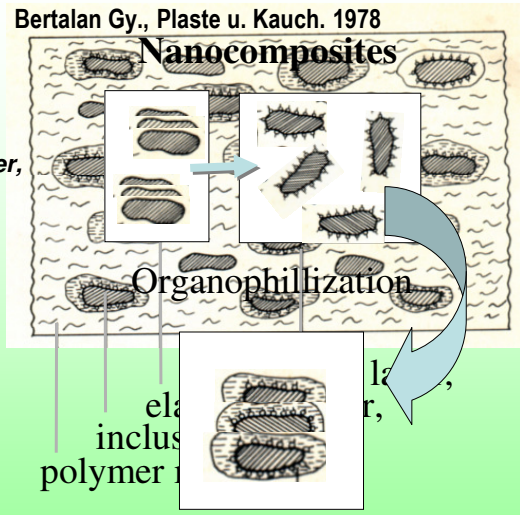
Multilayer interphase

BUTE -TVK US Patent., 4116897 (1978),
German Pat.ent 2453491 (1986)

Bertalan Gy., Plaste u. Kauch. 1978

Possible roles in FR systems:

- ***stress transferring compatibilizer,***
- ***catalyst controller layer,***
- ***active flame retardant or***
- ***sintering agent***



System selected:

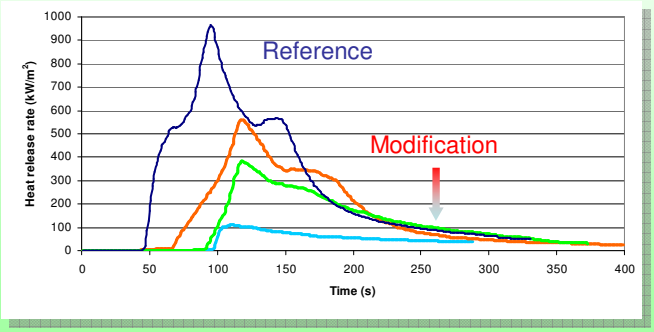
- ***HDPE,***
- ***Epoxy***
- ***P-epoxy***
- ***Polysiloxane***

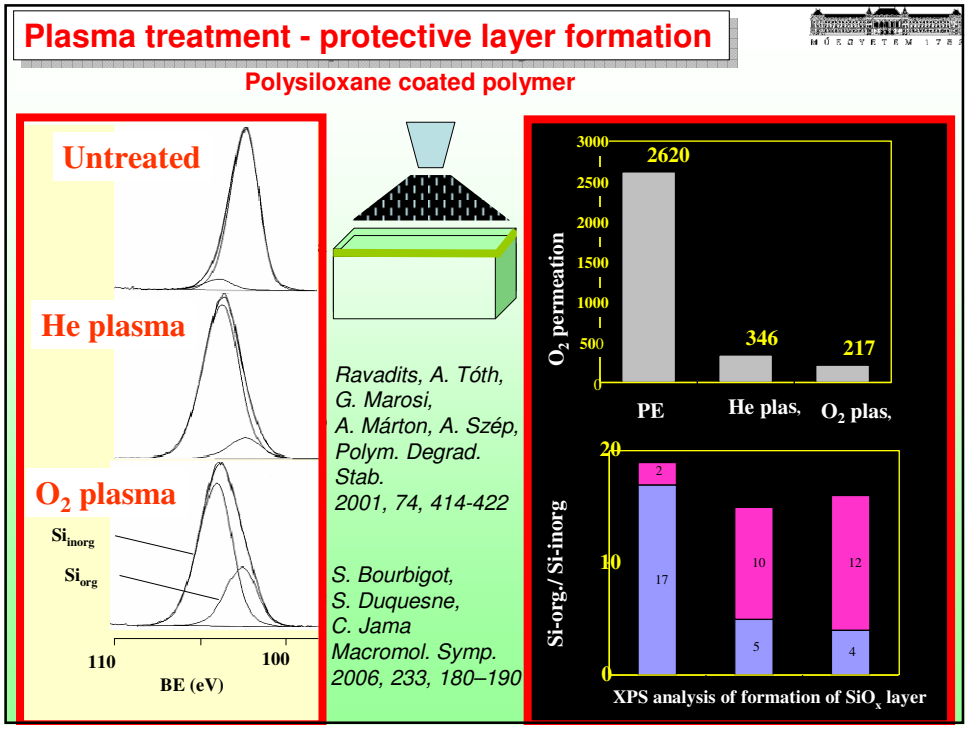
Improved mech. + FR performance?

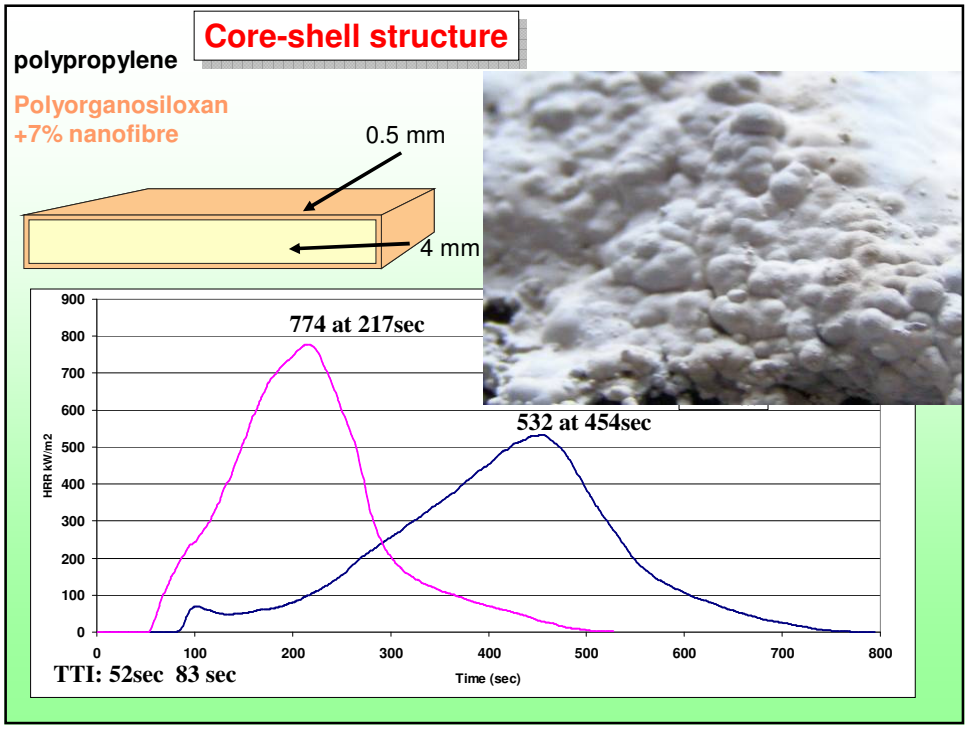
Characterisation clays containing nanocomposites

WP2 and WP4 results

Coating of Nanofillers Improves the Dispersion and Fire Resistance




Plasma treatment - protective layer formation
Polysiloxane coated polymer
Untreated
He plasma
O2 plasma
Sinorg
Siorg
110
100
BE (eV)
Ravadits, A. Tóth, G. Marosi, A. Márton, A. Szép, Polym. Degrad. Stab. 2001, 74, 414-422
S. Bourbigot, S. Duquesne, C. Jama Macromol. Symp. 2006, 233, 180–190
O2 permeation
3000
2500
2000
1500
1000
500
0
2620
346
217
PE
He plas,
O2 plas,
Si-org./ Si-inorg
20
10
0
2
17
10
5
12
4
XPS analysis of formation of SiOx layer


Core-shell structure
polypropylene
Polyorganosiloxan
+7% nanofibre
0.5 mm
4 mm
774 at 217sec
532 at 454sec
HRR kW/m2
900
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
800
Time (sec)
TTI: 52sec 83 sec

Production of car parts

Nanofire

WP 6

- Original MOPLEN HP 500 H
- 10 % nanofibre with compatibilizer

Conclusions

Nanocomposites – Fire-safe car elements:

Hungarian contribution:

- New analytical and modelling method
- Interface modification – improved performance
- Prototype production by SME

Further relating projects:

Multihybrids project (IP): controlled nanocomposite production
H-contribution: in line application of the new method for quality control and prediction

PrediFire project (STREP) : - correlation between micro- and large- scale measurements
- partially common project meetings.
proposed by the project officer

Common plans for forming an IP consortium for EU7

Contribution to dissemination
at
EUROFILLER
Budapest, August 2006 and

3rd China-Europe Symposium
on Processing and Properties
of Reinforced Polymers

Budapest, June 11-15, 2007

Thank you
for
your attention!