Case Study	MCNM	Study Materials	Applications
Avanzare	Graphene oxide functionalised with chitosan	Graphene oxide	Substitute halogenated flame retardant products used currently
		Commercial Chitosan	
CIAC	SiO_2 - APTES	SiO_2 - APTES	Improve the mechanical resistance of building materials (+20% compressive strength compared to untreated concrete).
		SiO_2	
		APTES	
	SiO_2 - ZnO	SiO_2 - ZnO	Can be utilised in building coatings for photocatalytic decontamination (NOx gases removal). SiO2-ZnO uses light radiation to photo-oxidate NOx gases to nitrates (NO and NO2 are transformed in NO3); nitrates deposit on the surface after the conversion, and rain can clear them.
		SiO_2	
		Zn acetate dihydrate	
		Unsupported ZnO	
Encapsulae	Nanoclays functionalized with clove essential oil. Sepiolite and benitonite clays	Sepiolite	Anti-pest cereal grain packaging. Avoid te termal degradation of essential oil during thermoplastic processing

	bentonite clays	Bentonite	
Laurentia	Core-shell $SiC@MO_2$ Nanoparticles for nanocomposites (M = Ti or Si)	1.1_SiC@TiO2_60	Anti-stick coatings for bakery applications and Sol-gel coatings for metal protections Shel: Improves dispersion of NPs into matrix and reduce toxicity Core: Improves mechanical and thermal properties and improves durability.
		1.1SiC@TiO2_500	
		2.1_ SiC_60	
		3.1_TiO2	

Safety goals	Sustainability goals	Main Action	Alternatives Materials
No critical materials are used	Reduce the water consumption which is used to wash the final product	Synthesis/Process parameters will be modified according to WP3 to improve functionality, safety and sustainability	Whey Protein/Casein
No harzardous materials are used	Reuse the material lost during the production 80%		SiO_2
Optimization of powder handling (lowe energy and water impact)	Liquid wastes (EtOH, Acetic acid, Hexane, Water) produced after centrifugation step can be collected and recycled by destillation	Tracking the yield, waste and emissions during the production step.	
Ethanol is used instead of water to better control the process			
Hexane must be replaced due to the environmental problems it can cause			
SiO_2 is a powder, what increasis occupational risks. Cold be solved by having the SiO_2 suspended in a liquid	Change acetate to reduce CO_2 emissions. Calcination of Zn acetate produces CO_2	Tracking the yield, waste and emissions during the production step.	
		Evaluate routes of exposure	
No toxicity has been observed		Consider the impact of nitrates on the environment --> mitigation strategies	
		Release on MCNMs from polymer packaging must be evaluated: nanoclays, oil, encapsulant.	
		Get data on degradation of MCNMs during thermoplastic processing	
		It is needed a toxicity test	

Replace the hazardous materials that are being used (organic solvents). The emissions of chemicals in air and water are not relevant due to their low quantity	1. Proven sustainability of the products would give to Laurentia an important market competitive advantage of non-stick coatings 2. With the addition of SiC@TiO2 nanoparticles it is possible to improve the non-stick properties of the fluorinated free coatings	Replacing the organic solvent which is the most harzardous	
		Reduction of GHG emission by using a microwave	
		They are looking for a way to increase the yield by using some non-aromatic solvent	
		Consider reduction of energy consumption	
		Get energy from renewable resources	