

**“Joint innovative training and teaching/learning program in
 enhancing development and transfer knowledge of application of ionizing radiation in materials processing”
 (Project acronym: TL-IRMP)
 AGREEMENT NUMBER 2014-1-PL01-KA203-003611**

Course module

Total hours of lecture: 60 hours (6 ECTS) in INCT (07/09-17/09, 2015) and 30 hours (3 ECTS) in UNIPA (28/09-02/10, 2015) learning programme
Scientific visit to industrial irradiation facilities and practice: 6 hours in INCT (11/09, 2015)
Total hours of laboratory and exercises: 6 hours in UNIPA (02/10/2015)

• **Training /learning course in INCT (Sept. 7-17, 2015)**

First week	Sept.7 (Mon.)	Sept. 8 (Tues.)	Sept.9 (Wes.)	Sept.10 (Thurs.)	Sept.11 (Fri.)
9:00-10:30	Basic radiation physics (Diana ADLIENÉ)	Dosimetrical principles and radiation protection (Diana ADLIENÉ)	Radiation measurements: instruments and methods (Diana ADLIENÉ)	Radiation engineered hydrogels (Clelia Dispenza)	Practice dosimetry in sterilization plant (whole day)
break					
10:45-12:15	Radiation interaction with matter (Diana ADLIENÉ) Last version: 17.08.2015	Radiation generators (Diana ADLIENÉ)	Radiation effects in Polymers (Dilek SOLPAN)	Radiation synthesis of polymer nanoparticles (Clelia Dispenza)	
break					
13:00-	Radiation chemistry of liquid	Radiation chemistry of	General aspects of radiation initiated	Radiation engineered	

14:30	systems (Dilek SOLPAN)	organic molecules (Dilek SOLPAN)	polymerisation (Clelia Dispenza)	multifunctional nanoparticles (Clelia Dispenza)	
break					
15:00-16:30	Radiation chemistry of water and aqueous solutions (Dilek SOLPAN)	Radiation chemistry of organic solids (Dilek SOLPAN)	Radiation-induced polymerisation in solution, dispersion and emulsion. (Clelia Dispenza)		Question /answer

(Sept.12-13, 2015, free)

Second week	Sept.14 (Mon.)	Sept.15 (Tues.)	Sept.16 (Wes.)	Sept.17 (Thurs.)	Sept. 18 (Fri.)
9:00-10:30	Radiation-induced grafting: General aspects (Dilek SOLPAN)	Optimization of the grafting proces (Dilek SOLPAN)	Application of radiation induced grafting I (Dilek SOLPAN)	Active packaging (nanotechnology) of food and its combination with irradiation (Clara Silvestre)	departure
break					
10:45-12:15	Comparison of the different methods of radiation grafting (Dilek SOLPAN)	Influence of polymer morphology Effect of the irradiation conditions: under vacuum, and in air (Giuseppe Spadaro)	Application of radiation induced grafting II (Dilek SOLPAN)	MAP of food and its combination with irradiation processing (Clara Silvestre)	
break					
13:00-14:30	Ionizing radiation effects on polymers Parameters affecting radiation effects on polymers (Giuseppe Spadaro)	Heterogeneous oxidative degradation ; influence of the dose rate (Giuseppe Spadaro)	Reasons to apply irradiation pastORIZATION in food processing (Clara Silvestre)	Survey on the Relevant Methodologies for characterisation of irradiated materials and Future trends of irradiation applied to food packaging	

				(Clara Silvestre)	
break					
15:00-16:30	Radiation effects on the most common polymers (Giuseppe Spadaro)	Effects of radiation on polymer properties (Giuseppe Spadaro)	Radiation processing to improve functionality of biodegradable food packaging (Clara Silvestre)		

• **Training /learning course in UNIPA (Sept.28-Oct.2, 2015)**

week	Sept.28 (Mon.)	Sept.29 (Tues.)	Sept.30 (Wes.)	Oct.1 (Thurs.)	Oct.2 (Fri.)
9:00-10:30	Interaction of ionizing radiation with master Polymer crosslinking via chemical and physical methods (Grazyna Przybytniak)	Radiation crosslinking of various types of synthetic polymers Radiation dosimetry for quality control in radiation processing plants (Grazyna Przybytniak)	Medical applications-hydrogels, UHMWPE artificial implants Radiation long-chain branching in polymers used for the production of packaging film (Grazyna Przybytniak)	Radiation-initiated cross-linking polymerization – Part 2 – Applications (coatings, adhesives, composites) – Optimization of performances (Xavier Coqueret)	Lab Excise (whole day)
break					
10:45-12:15	Natural polymer systems: structural properties, related applications and desirable modification: <u>1.</u> Basic components and raw materials <u>2.</u> Composites/Nanocomposites and nanoparticles (Krystyna Cieřla)	An effective irradiation methods for wires and cables Production of heat shrinkable tapes and tubes (Grazyna Przybytniak)	Radiation-initiated cross-linking polymerization – Part 1 – free radical chemistry – cationic chemistry – reaction monitoring – kinetics and microstructural aspects (Xavier Coqueret)	Radiation modification of proteins and composites/nanocomposites based on proteins. Basic knowledge and practical applications (Krystyna Cieřla)	

break					
13:00-14:30	Determination of radiolytic yields for scission and cross-linking in polymers exposed to high energy radiation (Xavier Coqueret)	Basic aspects of chain polymerization mechanisms and kinetics: from conventional initiation to radiation-induced processes (Xavier Coqueret)	Radiation modification of polysaccharide: hydrogels formation and microencapsulation of active components Application of radiation modified polysaccharide hydrogels (Krystyna Cieřła)	Radiation supported production of high quality plastic closed-cell foams A worldwide view of radiation processing in material (Grazyna Przybyniak)	
break					
15:00-16:30	Radiolytic synthesis of metal nanoparticles – Basics and applications (Xavier Coqueret)	Chemical and physical modification of polysaccharide systems: specific features of electromagnetic radiation Radiation degradation of polysaccharides and modification of activity of active polysaccharides. (Krystyna Cieřła)	Radiation modification of polysaccharide composites for packaging Radiation modification of polysaccharide composites: potential for the other areas. (Krystyna Cieřła)		Q./A.

(Oct.3, 2015, departure)