

# Radiation Technologies: Processes and Products

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The **Radiation Technologies: Processes and Products** activities focus on the research, development and demonstration of the interaction of ionising radiation with matter for further application in Industry or other entities. Since 1989 these activities have been closely related to the gamma radiation facility (UTR), whose main applications are the sterilization of medical devices and pharmaceuticals and the decontamination of other products. These activities have been leading to an incremental interest by Industrials that have in turn led to a joint venture in 2003 for the management of UTR by CHIP, with scientific and technical support provided by ITN researchers.

Nowadays, the group has a consultant role on sterilization and decontamination procedures, whenever it is solicited by the authorities or private industries. The group also develops work with the National and International normalization, standardization and certification bodies (IPQ, CEN and ISO). The UTR facility was upgraded by CHIP and future work will be carried out in compliance with ISO and European standards in the perspective of obtaining accreditation.

In order to develop new radiation technology applications, the upgrading and renewal of facilities are being carry out. This project implies ionizing radiation equipment (e.g.: accelerator and gamma experimental facilities), a multidisciplinary laboratory with controlled environment and application of an automation /robotic systems in the facilities.

The main Research and Development activities are focused on new technologies for further application of the ionising radiation on Food, Pharmaceutical, Wastewater treatment, Polymer Industry and other areas.

The main purpose of the **microbiological** work is to develop and implement validation technologies for inactivation procedures for micro-organisms, mainly by ionizing radiation (e.g.:  $\gamma$  and e-beam).

These technologies are based on microbiological studies on the bioburden in/on the products, and aim to improve quality in this field.

Molecular Biology techniques are also being developed to detect potential pathogenic microorganisms on environmental samples.

Hazard analysis and the control of critical points in the production lines of the studied products are part of the validation studies, carried out for the **Pharmaceutical** and **Food** Industries. Environmental control in surgical operation theatres at hospitals is also carried out.

In order to improve our understanding of the Radiation Procedures the influence of dose rate and the type of radiation are studied using materials and micro-organisms.

The **Synthetic** and **Natural Polymers** studies aim to use radiation both for developing new materials and for improving the quality of existing materials. These studies also aim to improve understanding about the interactions between radiation and these materials in order to avoid damaging the final product. Copolymerisation, reticulation and other effects induced by radiation are tested (carried out and characterised) to improve the properties and biocompatibility of new materials to be used for biomedical and environmental applications.

The development of these technologies could contribute to a prevention, correction and control of contamination on public health related issues.

The Group collaborates with several Universities<sup>1</sup> and Polytechnic and Research Institutes<sup>2</sup>.

The training and the know-how diffusion are one of the main issues of this Group, so national and international students are developing work within our projects in order to obtain academic degrees (Graduation, MsC, PhD).

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<sup>1</sup> Universidade de Lisboa, Universidade de Coimbra, University of Uppsala -Sweden, Faculdade de Ciências Veterinárias.

<sup>2</sup> INIA, ESAS, ICAT, ESTeSL, Laboratório Militar.

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## Research Team

### Researchers

- M.L. BOTELHO, Auxiliary Research, Group leader
- L. M. FERREIRA, Research Assistant

### Technical Personnel

- H. M. MARCOS, Informatics Operator

### Students

- S. CABO VERDE, PhD student, FCT Grant
- M. H. CASIMIRO, PhD student, FCT Grant
- P. MATOS, ITN Grant
- R.MELO, ITN Grant
- L. ALVES\*

### Funding (€)

Research Projects:	115.455,00
Expertise Services:	1.756,00
<b>Total:</b>	<b>17.211,00</b>

### Publications<sup>i</sup>

Books:	2 in press
Journals:	4 and 2 in press
Proceedings:	3 in press
Conf. Communications:	
Other publications:	7
Theses: MSc	1
BSc	2

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\* On leave from University of Uppsala