



Contribution ID: 54

Type: Oral

## Low-Energy Electron Irradiation for Novel Applications in Medical Production and Pharma

*Wednesday, 26 April 2017 17:30 (20 minutes)*

Currently most  $\gamma$  or high energy EB ionizing irradiation processes for medical and pharmaceutical production are provided by external services. Only a few applications rely on low energy electron irradiation: e.g., syringe tub sterilization at high throughput filling lines. But more complex and expensive logistics as well as demands for flexibility in small customized production batches calls for an irradiation processes integrated into the production chain. The simple implementation of irradiation technologies into typical production environments, is hindered by the limited penetration depth of low energy electrons and the expense of multisource arrangements needed for 3D-objects. Therefore, Fraunhofer FEP and partners has developed a new low energy electron irradiation application available for production integrated solutions. To avoid multisource arrangements for homogeneous irradiation of 3D-objects, a toroidal shaped electron beam source was developed. By using high-voltage glow discharge for electron generation, a compact and robust electron source for energies up to 150 kV was born. Original targeted for treating bulk goods, a single source is perfectly adapted for surface modification or sterilization of 3D products like implants, or continuous feed material like tube packaged parts. First experimental results of operation, the electron generation principle and the first application (seed treatment) will be presented.

Liquids irradiation traditionally requires high energy irradiation because of the penetration depth requirements. Especially in the case of vaccine production, virus inactivation by irradiation is very interesting because of the high efficiency in antigen conservation. But high energy irradiation at external facilities is not practicable because of the strong safety requirements. Within an ongoing Fraunhofer funded project, an interdisciplinary team developed a low energy irradiation method for virus containing suspensions to produce inactivated but still very efficient vaccines. Actually results about irradiation technology and vaccine testing will be presented. The new inactivation technology will make vaccine production faster and cheaper with higher efficacy at the same time.

Together with some actually additional development directions like:

- Miniaturized electron beam sterilization compartment for on-site sterilization of packaged products;
- Electron beam modification of cell-therapeutic substrates;

we can show an enormous potential for low electron irradiation processes in medical and pharmaceutical production.

More flexibility in small batch production and a close production chain inside the facility increase the safety level and the production efficiency at the same time. Low energy electron irradiation will play an important role in this paradigm change over the next years to fulfil the requirements of more than just the healthcare industry.

## **Country/Organization invited to participate**

Germany

**Primary author:** Mr ROEGNER, Frank-Holm (Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP, Germany)

**Co-authors:** Mr WEIDAUER, André (Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP, Germany); Mr PORTILLO CASADO, Javier (Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP, Germany); Mr THOMA, Martin (Fraunhofer Institute for Manufacturing Engineering and Automation IPA, Germany); Mr ULBERT, Sebastian (Fraunhofer-Institute for Cell Therapy and Immunology IZI, Germany)

**Presenter:** Mr ROEGNER, Frank-Holm (Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP, Germany)

**Session Classification:** A10

**Track Classification:** IRRADIATION FACILITIES