

## Advertisement for Incubation of Technology

<b>Title of the technology</b>	Design and fabrication of compact alpha irradiator for BARC BioAlpha
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### Current state of Technology

Automated Alpha Particle Irradiator-Bioalpha technology is available for technology transfer. The compact model is improvised model for better usability and with more user friendly features.

### General Information

Understanding radiation effects of alpha particles to biological systems are relevant to evaluate and minimize the radiation risk in case of accidental/environmental/ occupational radiation exposure to workers/public as well as for improvement of TAT and charged particle cancer therapy. However, conducting experiments to irradiated samples with alpha particles has following difficulties:

- (i) Biological samples containing live cells are required to be irradiated when samples are placed in air. However, short range (few mm) of traversal of alpha in air, makes it difficult to irradiate the biological samples with alpha particles with accuracy in energy.
- (ii) Alpha particles emitted from a point of source will travel in all directions and energy of particles reaching to target will vary depending on length of its path travelled. Hence, irradiation with alpha particles needs collimated particles reaching to target.
- (iii) Manual exposure of samples will result is variation in dose due to transit dose.
- (iv) Without automation and computerized irradiator, easy irradiation of samples with defined dose/accuracy and to keep record of irradiation parameters will be difficult.

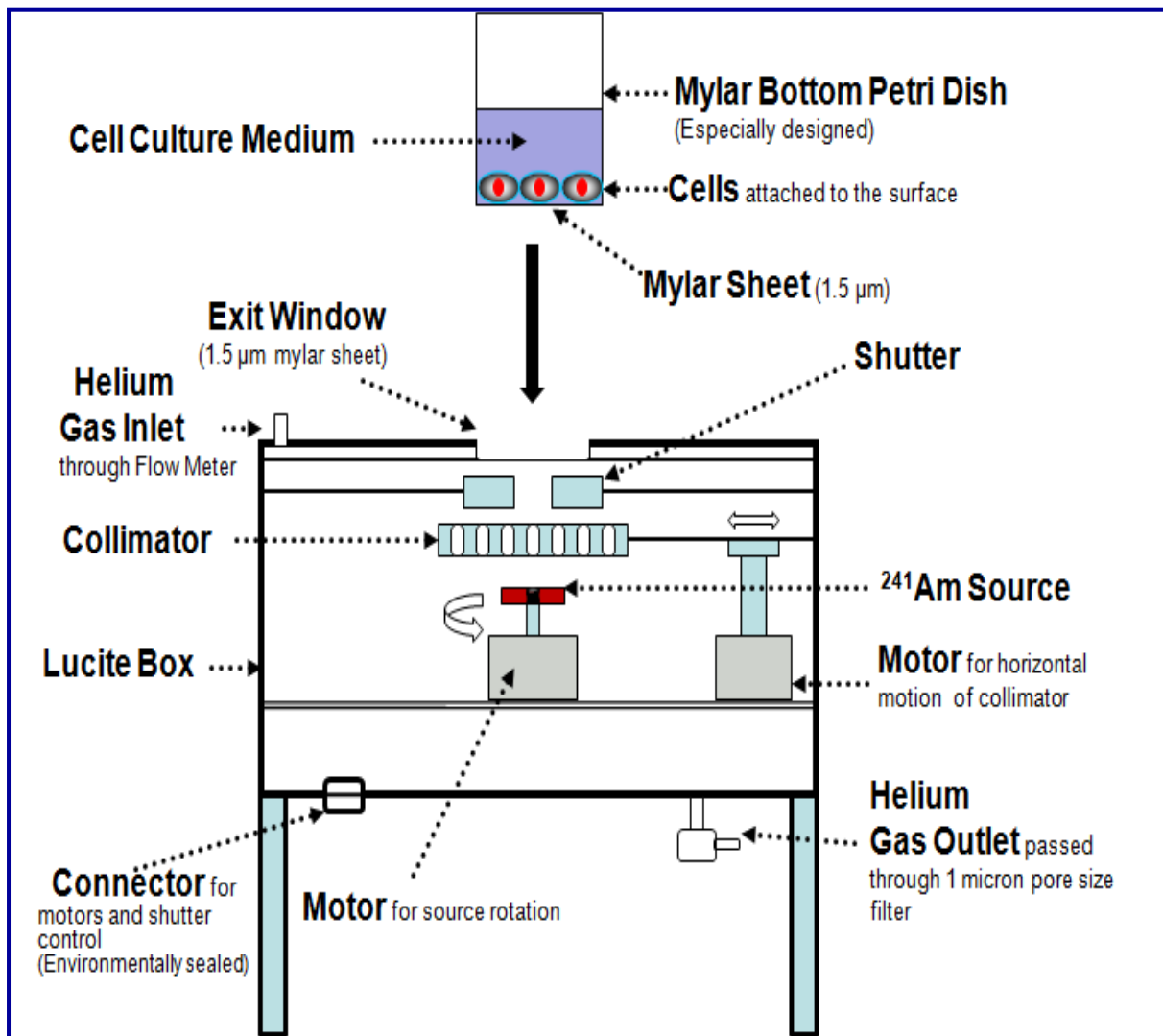
The BioAlpha is designed and fabricated to overcome above limitations for performing smooth and easy experiments to irradiate samples with alpha particles.

## Comparison of Features of Existing and Proposed compact Alpha irradiator

Feature	Existing System	Proposed System	Remark
<b>Size of the irradiator</b>	Existing irradiator is table top but bulky (~50 cm height x ~50 cm diameter) with separate computer and electronic control units mounted in a 19" Rack.	Size is 30 Cm x 30 cm x 30 cm including dedicated controller along with touch screen and interfacing electronics. It's a Table top unit	Compact model. Can be placed inside the incubator
<b>Irradiation port</b>	Single Specimen holder	3 ports to accommodate 3 specimens at a time	Can handle up to 3 specimens
<b>Weight</b>	~20 kg irradiator unit ~35 kg rack with computers	~8 Kg including all	Light weight
<b>Display and interface</b>	Rack mounted PC with external monitor placed on table	Touch screen panel mounted/fitted on the instrument. Wireless Remote display included. Can connect to PC on LAN network	User friendly & flexible design
<b>Program setting</b>	Limited settings.	Customizable settings based on user requirements	Result will have parameters and settings used on each test conducted.
<b>Irradiation dishes</b>	O-ring type. Snap fit. Difficult to achieve the wrinkle free membrane surface	Screw type. Wrinkle free membrane surface can be achieved.	Leak proof design. Easy to replace the membrane.
<b>To be housed for incubation and irradiation</b>	Kept outside of incubator. Exposed to Ambient temperature and pressure.	Unit will be housed inside the incubator/chamber	Irradiation & test can be conducted in a controlled environment without moving the samples

<b>Helium Gas flow detection</b>	Not available	System will alert if no helium gas flow. Operation starts only if helium gas flow & pressure are adequate.	Fail proof design
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**Working of the System (with schematic block diagram)**

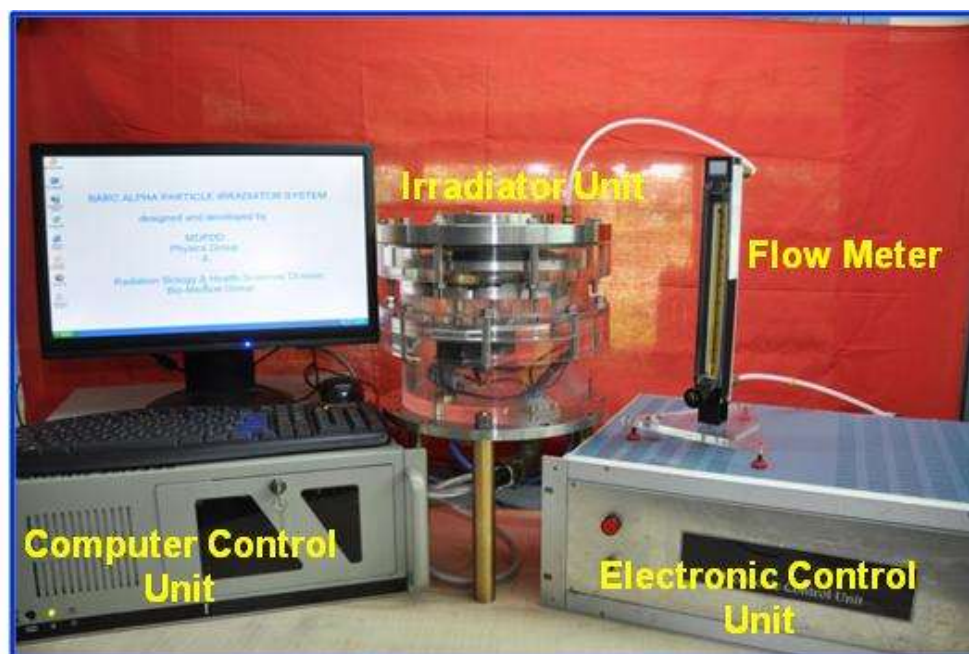


**Schematic diagram of BioAlpha depicting major components**

**Applications of the System**

Radiobiology Research and to evaluate Anti-Cancer Efficacy of Alpha Particles Radiation

## Picture/Photo of the System –



**Whether the parent product/ technology/ process is patented: No**

**If yes, provide the details –**

**Deliverables** –Design and development of compact alpha irradiator for user friendly and radiobiology experiments under physiological conditions

**Justification for Incubation –**

A benchtop alpha irradiator (named as BARC BioAlpha) was designed and developed indigenously about 10 years back. The irradiator is in extensive use in our laboratory to conduct several radiobiology experiments, which resulted in several publications in many high impact factor journals. While use of irradiator, a need of compact model of alpha irradiator was realized which should be not only compact but also has more user friendly features to address several practical and experimental requirements for emerging radiobiology experiments. For example, currently alpha particle irradiation is performed at room temperature and due to cell culture medium pH change longer irradiation could not be performed. Moreover, to simulate human body physiological conditions irradiation needs to be performed at 37 °C and some experiments require longer irradiation. The bulky, cumbersome existing unit pose limitations for easy handling and movement of irradiator in the real scenario.

Hence, based on above requirements, it is being proposed to develop a compact alpha particle irradiator with all basic features of existing irradiator but more user friendly features as mentioned below. The proposed model would have better usability for radiobiology experiments in our laboratory as well other radiobiology laboratories in India and abroad.

**Facility and Infrastructure requirements:****Facility and Infrastructure to be provided by Incubatee/BARC:**

<b>Title Head</b>	<b>To be provided by BARC</b>	<b>To be provided by Incubatee</b>
Manpower/ expertise	Technical consultancy about requirements, features, testing of irradiator	Design and fabrication using their skilled electrical, mechanical and software staffs
Machinery and Equipment	Testing the instrument for radiobiology experiments	Machinery and equipment essential for design, fabrication and testing of alpha irradiator would be preferred.
Others	BARC will provide technical support about user requirement parameters	Parties with having experience of design and development of instruments/spares would be preferred.
<b>Special Requirements:</b>		
Any special requirements for plant, industry, location utilities, handling storage, safety etc.	Parties with having experience of design and development of instruments/spares with automation control would be required. If required, Party needs to show their fabrication/manufacturing facility.	

**Note: As per in-house technology incubation policy, the incubatee should be a licensee of the existing technology. Alternatively, the applicant will be required to take the license of the existing technology before entering incubation agreement.**

If interested in Incubation, kindly **download -> fill -> scan -> send** the application form to -

**Convener**  
**Task Force, Incubation Centre - BARC**  
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