Measuring Radon with AL54

Radon Measurement and Sensing

Radon gas, which is naturally released from rocks and soil, is about ten times heavier than air. Because of this, it often accumulates in enclosed spaces, such as basements and lower levels of buildings. For this reason, measuring radon is only meaningful in these enclosed environments.

For accurate results, radon must be measured over a long period. Its concentration is heavily influenced by factors like seasons, temperature, humidity, and airflow.

Furthermore, radon measurements should generally be performed by **experts** who have the knowledge to correctly place the monitors and interpret the data.

The AL 54 Sensor

The **AL 54** is a suitable choice for radon detection and further testing.

The AL 54's energy resolution of alpha particles is relatively low due to the scattering effect of its aluminum foil. However, it's still sufficient to differentiate between background noise and radon decay products.

For a significantly better resolution of the energy spectrum, you can carefully remove the aluminum foil with adhesive tape to gain direct access to the **PIN diode**. If you do this, you must operate the diode in complete darkness which will be accomplished by the collector cell.

The sensor's analog output allows for an energy spectrum analysis of the radon decay products 218Po and 214Po it detects. The pulse levels can be used to separate radon signals from background signal outputs.

The Collector Cell

The radon gas must be collected using a collector cell (10-100 ml) with a light barrier. The cell's interior has an electrically conductive surface with a positive voltage (400V) that directs the radon decay products (218Po and 214Po) directly to the PIN diode.

Several factors directly impact the sensitivity of the radon detector, including:

- The surface area of the detector
- The volume and geometry of the collector cell
- The electric field distribution within the collector cell

To successfully optimize these parameters, it is essential for the R&D lab to have a **radon source** and a **radon chamber** with a known radon concentration.