



Overview of Mirion Dosimetry Services Innovations

Mirion has been a leading innovator and pioneering developer of radiation detection, measurement, and monitoring technologies and solutions for more than 60 years. Through innovative solutions, Mirion has improved global radiation monitoring and safety programs, enhancing efficiency and effectiveness.

1990s: Direct Ion Storage (DIS) Technology Paves the Way for On-site Dose Read Processing of Dosimeters

Traditionally, passive* dosimetry involved a time-consuming badge management process, leading to delayed dose reports, often weeks or months late. In the early 1990s, Mirion developed a hybrid technology combining classic ion chamber techniques with contemporary data storage through metal oxide semiconductor field effect transistor (MOSFET) analog memory devices. This new Direct Ion Storage (DIS) technology enabled the capture and storage of precise radiation measurements without the use of power supplies during dose accumulation – all within the small, compact confines of a dosimetry badge. It made on-site dose reads a reality.

See Figure 1.

The benefits of DIS technology include:

- Direct measurement of $H_p(10)$ and $H_p(0.07)$ over the entire energy range
- Pre-calibrated dosimeters can be read locally on-site
- Unlimited, instant read-outs anytime
- Dose information automatically recorded each time a read-out is performed
- Not sensitive to EM & RF interferences, operates at high dose and in pulsed fields
- Combines reliable ionization chamber technology with an electronic memory cell
- Self-reading for immediate determination of exposure

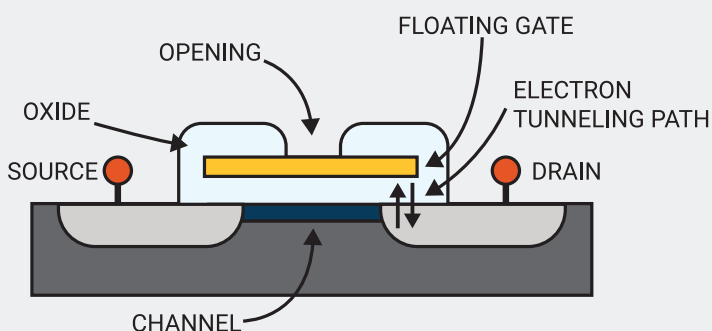


**Passive dosimetry refers to a method of measuring radiation exposure over a period of time using dosimeters that do not require an external power source or active monitoring during exposure. They are "passive" because: 1) they absorb radiation as it occurs over a set period of time (such as a week, month, quarter, or a year), 2) require off-site processing using special equipment (readers) to determine the dose received, and 3) do not provide immediate results, as dose reports are issued after processing. Passive dosimeters are widely used to help keep personnel (who work with/around radiation sources) below established regulatory dose limits.*

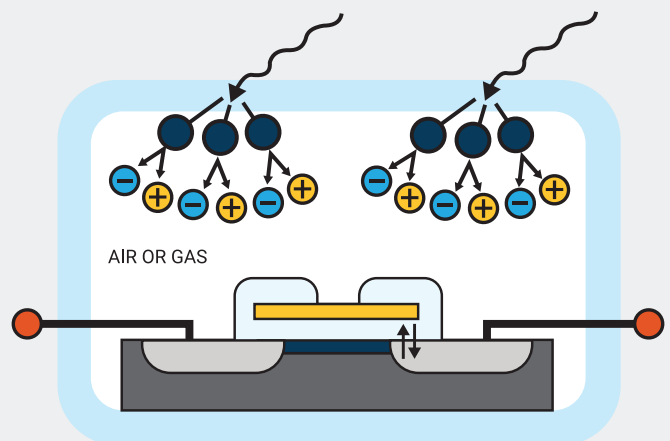
FIGURE 1

Direct Ion Storage (DIS) Technology

Self-reading for immediate determination of exposure



- Surface of the floating gate is exposed to surrounding space
- Ions in the form of electric charge are gathered within floating gate
- Source anode has a non-volatile memory cell element



- Memory cell is surrounded by ion chamber filled with gas
- Secondary electrons generated by initial interactions within chamber wall ionize the gas inside
- Ions are separated between the electrode and wall, then stored in memory element cell

2000s: Wireless, On-Demand Dosimetry Enabled by DIS and Instadose® Smarter Radiation Monitoring™ Technologies Streamline Badge Administration and Remove Mail-Back Hassles

Recognizing the potential of using DIS for precise radiation measurements and advanced wireless processing technologies for anywhere/anytime dose reads, Mirion developed its Instadose Smarter Radiation Monitoring platform in the early 2000s. These innovations paved the way for faster, easier dose results without the hassles of traditional passive dosimeters. The Instadose platform continued to drive the commercialization of industry-leading dosimetry solutions, offering digital, on-demand dosimeters under the Instadose portfolio.

The benefits of the Instadose Smarter Radiation Monitoring Platform include:

- Precise and accurate measurements based on two proprietary technologies: DIS and Smarter Radiation Monitoring™
- Unlimited on-demand dose reads at your fingertips
- Immediate online access to current and historical dose data and reports
- Eliminates wear period exchanges
- Reduces monitoring costs of postage and late/non-returned badge fees
- Streamlines administration with online account management
- Eco-friendly and sustainable — no more collecting, mailing, redistributing
- No Protected Personal Information (PPI) is conveyed by the dosimeter
- Soft daily reads provide more dose data points for richer dose insights
- Automated email notifications when a dose exceeds a user-specified level or when communication is overdue

15+ Years of Instadose Smarter Radiation Monitoring Innovations

In 2009, Mirion launched its first Instadose USB dosimeter with photon radiation measurement capabilities. Still today, it is the only accredited USB-compatible dosimeter that allows users to self-read their radiation dose anytime by inserting the dosimeter's USB connector into an Internet-enabled PC with dose results and reports immediately available online. And, for the first time, users were able to keep their Instadose badge and skip shipping and off-site processing – eliminating the time-consuming badge collection, mailing/returning, and redistribution cycle.

In 2015, Mirion launched its first completely wireless dosimeter (no USB PC connection needed) with the Instadose+ dosimeter. Featuring low energy Bluetooth® technology, the Instadose+ wireless dosimeter allows users to quickly, easily, and remotely transmit radiation dose data via smart devices using a free mobile app (Instadose Companion mobile app), PC, or InstaLink™ gateway. New advances within the platform also introduced new features and capabilities – enabling automatic, calendar-set reading schedules. Utilizing a single detector, the Instadose+ measures photon radiation energy.

In 2019, Mirion expanded upon the Instadose+ technology by incorporating a second detector, resulting in the launch of the Instadose®2 wireless dosimeter. This innovative device allows for the cumulative monitoring of photon and beta radiation measurements.

In 2024, Mirion further improves its wireless dosimetry capabilities to deliver more robust, stable connectivity and dose communication transmissions, along with increased battery life and performance. The Instadose®VUE wireless dosimeter is the first in its line to include an electronic display screen. This feature significantly improves visibility, feedback, and user interaction compared to previous models. Badge assignment details, wear information, operational status, and dose communication feedback are now easily visible on the dosimeter's screen. In addition, for the first time, a new compliance star feature – enabled by advanced motion-sensing technologies – provides absolute visual confirmation that the dosimeter is both functioning properly and being actively worn, increasing engagement and compliance.



**Instadose® USB
Compatible Dosimeter**



**Instadose®+
Wireless Dosimeter**



**Instadose®2
Wireless Dosimeter**



**Instadose®VUE
Wireless Dosimeter**