

Phosphor Imaging with the Sapphire Biomolecular Imager

Introduction

While fluorescent and chemiluminescent imaging techniques and their detectors are becoming more sensitive and selective, photostimulated luminescence from phosphor storage plates remains a key application for many researchers, especially for applications such as electrophoretic mobility shift assays (EMSA), enzyme assays, and in vivo imaging.

Traditional phosphor imagers are often single function and require a large footprint. The Azure Biosystems Sapphire Biomolecular Imager offers the ability to scan storage phosphor screens for filmless autoradiography, with exceptional dynamic range and image quality thanks to the use of laser excitation and photon multiplier tube (PMT) detection. The compact Sapphire Biomolecular Imager also incorporates exceptional visible fluorescent and near infra-red scanning along with true chemiluminescent and white light imaging making it a true lab workhorse.

Materials and Methods

Sample Preparation

An American Radiolabeled Chemicals ^{14}C standard with slices from 1000 to $0.004 \mu\text{Ci/g}$ was exposed to a BAS-MS storage phosphor screen ($0.9 \text{ DPM/mm}^2/\text{hr}$ sensitivity) for 3 hours.

Storage Phosphor Plate Imaging

Following exposure, the storage phosphor screen was imaged using the Phosphor Imaging module of the Sapphire Biomolecular Imager with standard excitation and detection settings. Samples were quantified and limits of detection (LOD) and dynamic range (DR) calculated.

Results and Conclusions

The Sapphire Biomolecular Imager captures high quality images with a large dynamic range from standard storage phosphor screens (Figure 1). Following sample quantification using AzureSpot analysis software, the LOD for American Radiolabeled Chemicals ^{14}C standard after a 3-hour exposure was determined to be $0.036 \mu\text{Ci/g}$. Furthermore, a highly linear dynamic range from 1000 to $0.036 \mu\text{Ci/g}$ was observed ($r^2 = 0.99$ [Figure 2]).

To conclude, the Sapphire Biomolecular Imager is capable of imaging storage phosphor screens producing high quality images for later quantification; while also offering the ability to rapidly image fluorescent, chemiluminescent and NIR samples all within a single compact footprint.

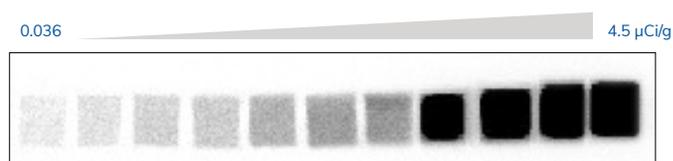


Figure 1. American Radiolabeled Chemicals Carbon-14 standard exposed to Storage Phosphor Screen for three hours then imaged on the Sapphire Biomolecular Imager.

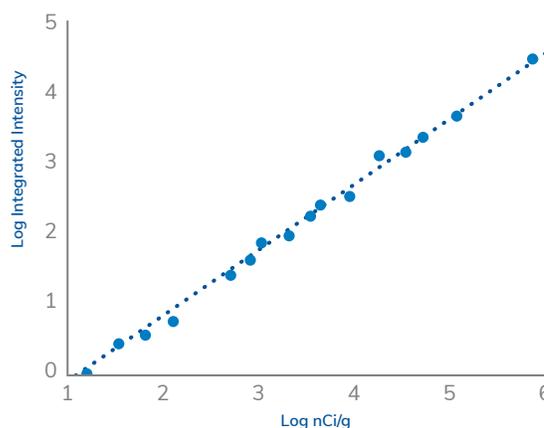


Figure 2. Sample: ^{14}C autoradiographic standard; Imaging: Phosphor; LOD: $0.036 \mu\text{Ci/g}$; DR: 5.4 orders of magnitude; Linearity: $R^2=0.99$

Step	Product	Part number
Sample preparation	American Radiolabeled Chemicals – ¹⁴ C standard	ARC0146F
Storage phosphor plate	BAS-IP-MS – Storage phosphor screen	IS1011
	Cassette for Phosphor Imaging	IS1012
Phosphor plate imaging	Azure Biosystems – Sapphire Biomolecular Imager with Phosphor Imaging Upgrade	IS1002, IS1004

Table 1. Materials and product numbers.