Quantum SOLUTIONS®

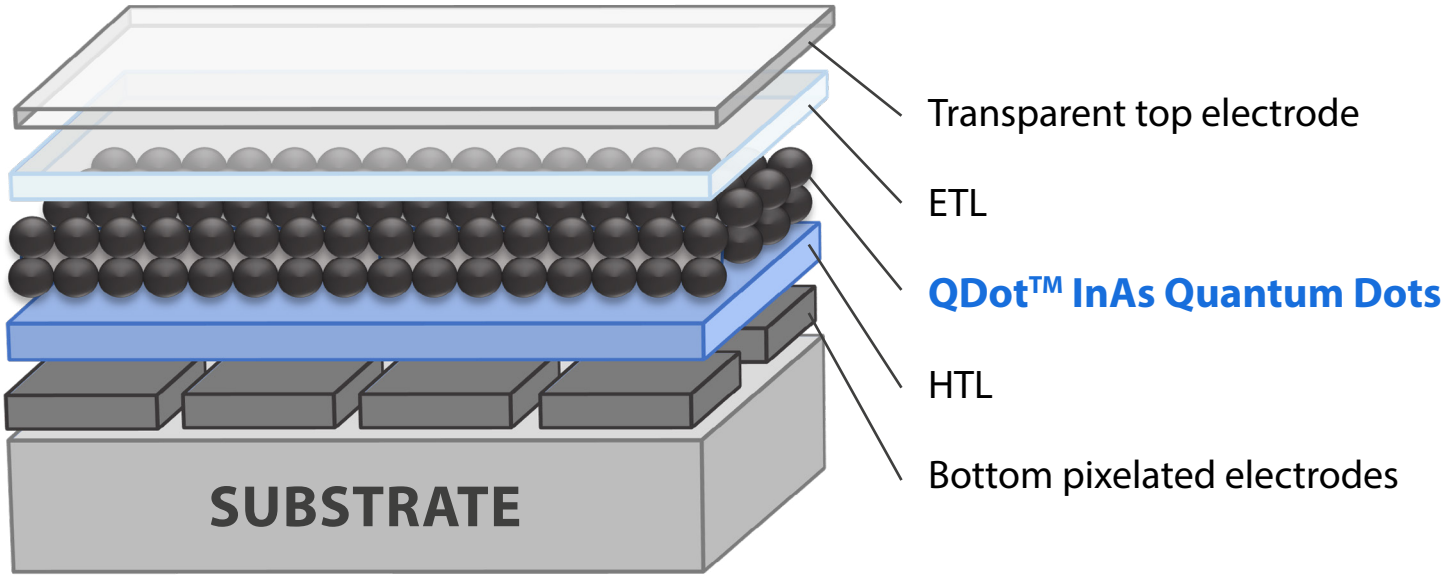
QDot™ InAs Quantum Dots

Technical Data Sheet

Introduction and product highlights

QDot™ InAs (Indium Arsenide) Quantum Dots absorb light from UV and visible up to the short-wave infrared (SWIR) spectral range. The absorption cut-off profiles can be tuned from 900 to 1600 nm simply by changing the nanoparticle sizes from 3 to 7 nm. This material has outstanding light absorption and photoelectrical properties and is considered the best lead-free quantum dot absorber in short-wave infrared (SWIR) photodetectors and image sensors.

QDot™ InAs quantum dots can be deposited within a QDot™ photodiode stack using spin-coating methods from a colloidal solution. In principle, a QDot™ photodiode stack consists of a substrate, an HTL (hole transport layer), a QDot™ InAs Quantum Dots absorber, an ETL (electron transport layer), and a transparent top electrode.



These novel solution-based methods for depositing thin films of compound semiconductor materials have made it possible to create artificial nanocrystalline InAs absorbing structures at affordable cost that offer unprecedented possibilities. Unlike epitaxially grown InAs or InGaAs thin films, the quality of quantum dot semiconductors is less dependent on the crystallographic characteristics of substrates and their interfacial relationships ensuring the device architecture flexibility and large-scale manufacturability on 8" or 12" wafers.

QDot™ InAs Quantum Dots offer the following advantages:

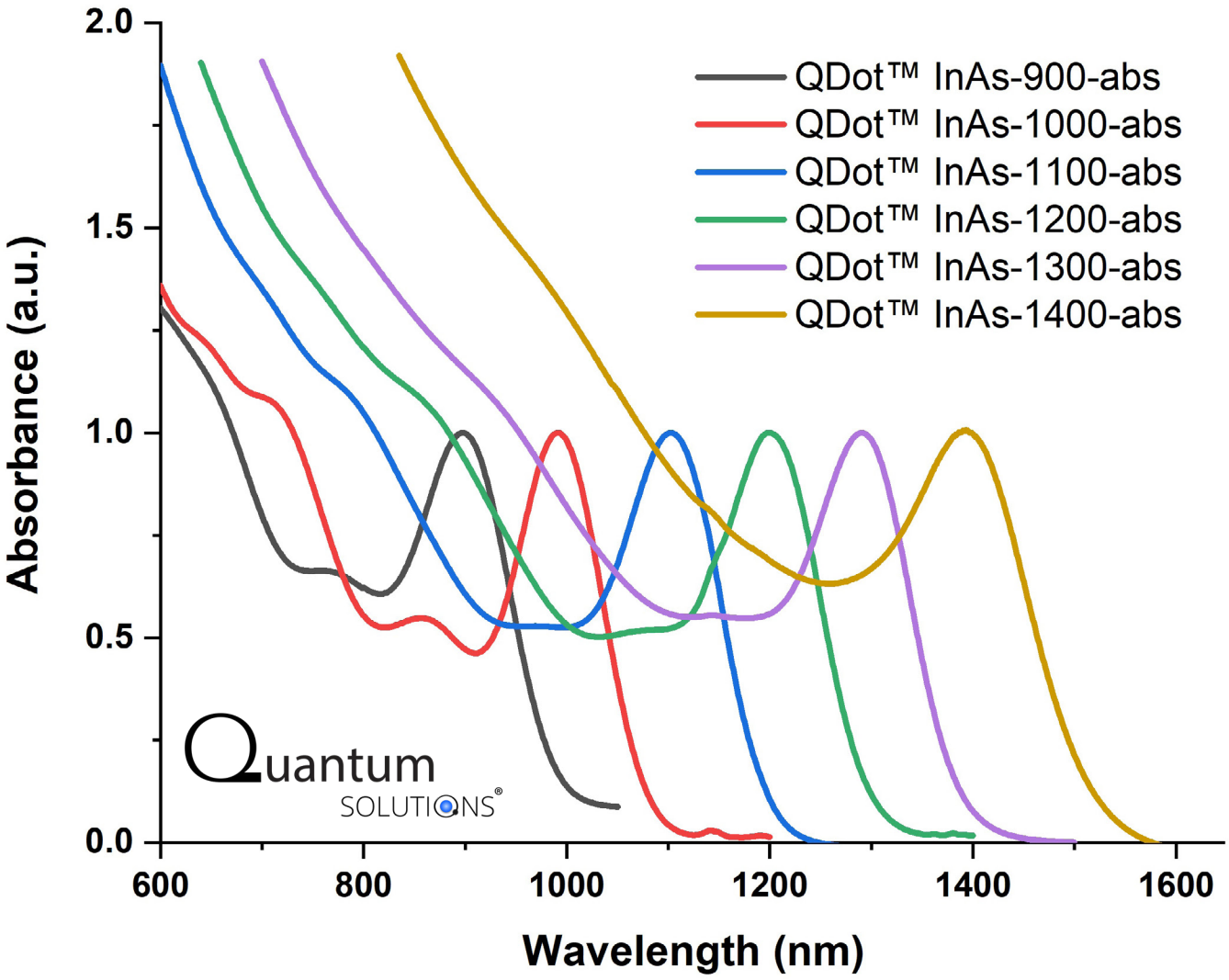
- ✔ Solution-processed compound semiconductor nanomaterial to be used in short-wave infrared (SWIR)/near-infrared (NIR) photodetectors and image sensors.
- ✔ Easy integration within a QDot™ photodiode stack through spin-coating or other printing processes, guaranteeing affordability and manufacturability on large 8" or 12" wafers.
- ✔ Lead-free and RoHS compliant, freely usable in consumer electronics, automotive, and machine vision applications.
- ✔ Fast decay time in the nanosecond range, opening up applications for Time-of-Flight (ToF) and LiDAR applications.

Specification of QDot™ InAs Quantum Dots

QDot™ Catalogue Number	Core type	Core size	Absorption peak in SWIR range	HWHM of absorption	Peak-to-valley ratio	Ligand concentration
InAs-**900**-abs	InAs	≈ 3 nm	900 ± 25 nm	< 70 nm	> 1.5	25-35 wt%
InAs-**940**-abs	InAs	≈ 3 nm	940 ± 25 nm	< 70 nm	> 1.5	25-35 wt%
InAs-**1000**-abs	InAs	≈ 3.5 nm	1000 ± 25 nm	< 70 nm	> 1.5	20-30 wt%
InAs-**1100**-abs	InAs	≈ 4 nm	1100 ± 25 nm	< 70 nm	> 1.5	20-30 wt%
InAs-**1200**-abs	InAs	≈ 5 nm	1200 ± 25 nm	< 70 nm	> 1.5	15-25 wt%
InAs-**1300**-abs	InAs	≈ 5.5 nm	1300 ± 25 nm	< 70 nm	> 1.5	15-25 wt%
InAs-**1400**-abs	InAs	≈ 6 nm	1400 ± 25 nm	< 100 nm	> 1.2	15-25 wt%

General Specification	
Quantum dot core type	InAs
Capping ligand	Fatty acid
Appearance	Black liquid
Form available	Octane: 10 or 50 mg/mL Toluene: 10 or 50 mg/mL
Deposition method	Spin-coating with solid ligand exchange or solution ligand exchange

Absorption profiles of QDot™ InAs Quantum Dots



Notes for handling

Shelf Life 12 months. Shipping and storage temperature 4-25 °C. Store in DARK conditions, in original packaging or in airtight, sealed packaging inside a glovebox. Repackage in a glovebox only. Avoid contact with air. Process inside the glovebox or another enclosed inert gas environment.