

SOLAYER's "Zero Bow" wafer technology lets manufacturers produce superior near infrared band pass filters for 3D sensor applications

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[SOLAYER](#) today reported that it has demonstrated a Near Infrared Band Pass Filter (NIR BPF) with superior filter properties, enabled by the novel "Zero Bow" technology for thin glass substrates incorporated in its AVIOR M-300 HVM platform. SOLAYER innovates high-performance manufacturing equipment and processes used to mass produce high-quality coatings, filters, and other films.

The new filter, known as the X41, enables 3D sensors found in consumer electronics, automotive, security, and other applications. The development validates the enabling capabilities of SOLAYER's technology, solves a frustrating technical problem (bowed wafers), and gives manufacturers a viable solution to produce superior NIR BPFs.

NIR BP filters are used today in a wide range of optical sensor applications. They play an important role as key components for optical measurements, distance measurement applications, and systems for gesture recognition (TOF, Time-of-Flight).

The special characteristic of the filters enables:

- Accurate distance measurements at low light intensity conditions
- Measurements with higher sensitivity
- Higher precision at normal signal light levels

SOLAYER developed its unique "Zero Bow" technology for ultra-thin glass substrates (0.2 mm thickness), which enables customers to apply wafer bonding technology on high-performance NIR BP filters for the first time.

Key Applications:

- Advanced sensor technologies
- Mobile gesture recognition technology
- Automotive applications (TOF, LiDAR)

The X41 filter is based on a specially developed process that enables NIR BP filters with outstanding properties to be manufactured more efficiently. With the process, the NIR BP filter is produced through the controlled interplay of filter structure, mechanical properties of thin glass, and new layer

materials. The SOLAYER process enables the build-up of layers in the AVIOR M-300 system with specific properties up to the Angstrom range in a controlled manner, with special process control and a new filter design with a new layer system.

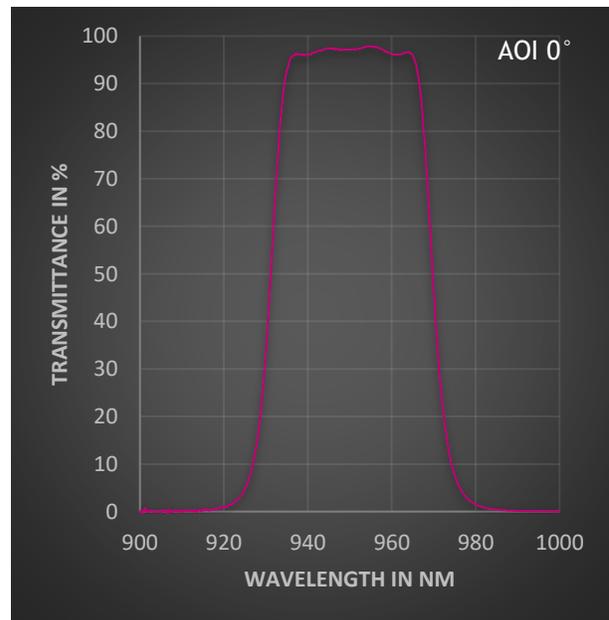
NIR BP filters consist of alternating 2-layer systems of hydrogen-doped silicon (Si: H) and silicon dioxide (SiO₂). Anti-reflex and blocker filters are usually built on the back. Due to the different layer properties, however, it has not yet been possible to manufacture filters on very thin substrates (≤ 0.2 mm) without encountering deflection, or ensuring very good filter properties, like high transmission in the BP, optimal AOI properties and optimal blocking properties. The “Zero Bow” technology developed by SOLAYER for NIR BP filters on very thin substrates brings significant advantages for customers.

They include:

- Reduced complexity in subsequent process steps
- Higher yield in production, and simplification of subsequent processes
- Enables the move to wafer bonding technologies

SOLAYER’s CEO, Mathias Hoefler noted that the company’s enduring goal is to help manufacturers unleash new waves of product innovation. Shattering the technical bottlenecks presented by bowed wafers is key to the effort. “The X41 filter enabled by our “Zero Bow” technology demonstrates the infinite possibilities and we’re excited to bring the enabling technology and related expertise to our customers” he said.

Transmittance in the band pass	T avg in PB > 96.0 % T min in PB > 92.0 %
Blocking in cut off bands	OD > 5 avg (UV - 900 nm) OD > 5 avg (1000 - 1100 nm) OD > 4 abs (UV - 900 nm) OD > 4 abs (1000 - 1100 nm)
AOI Shift	Delta CWL AOI 0° - AOI 30° < 11 nm
Slope	T (90 %) - T (10 %) < 9 nm
Substrate size	200 mm round
Substrate thickness	< 200 μ m
Warpage	0 mm



Filter design X41 series

The high-performance X41 filters are characterised by the following features:

- High transmission: > 96 %
- High end blocking performance for both 350 - 900 nm and 1000 - 1100 nm regions
- “Zero Bow” (note: > 11 mm bow is typical market value for NIR BP filter 0.2 mm thick glass substrates)
- Tunable filter shape for high-end LiDAR applications



“Zero Bow” wafer
X41 filter, 200 mm x 0.2 mm



AVIOR M-300 deposition platform

For information on SOLAYER, please visit www.solayer.com.

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