Raven (advanced material)

Transcending the limits of TiO_2 catalysts

Sustaining the Planet with 0.62 watts

A.virtual

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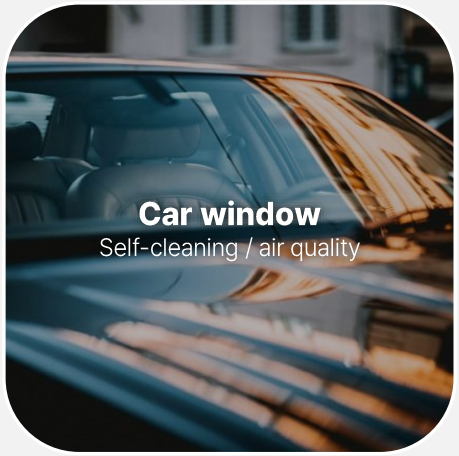
Industries applying UV-activated catalyst, Titanium Dioxide(TiO_2)

- Through the catalytic reaction, powerful oxidizing agents are generated.
- Enabling the decomposition of organic matter, antibacterial effects, air purification and self-cleaning functions.

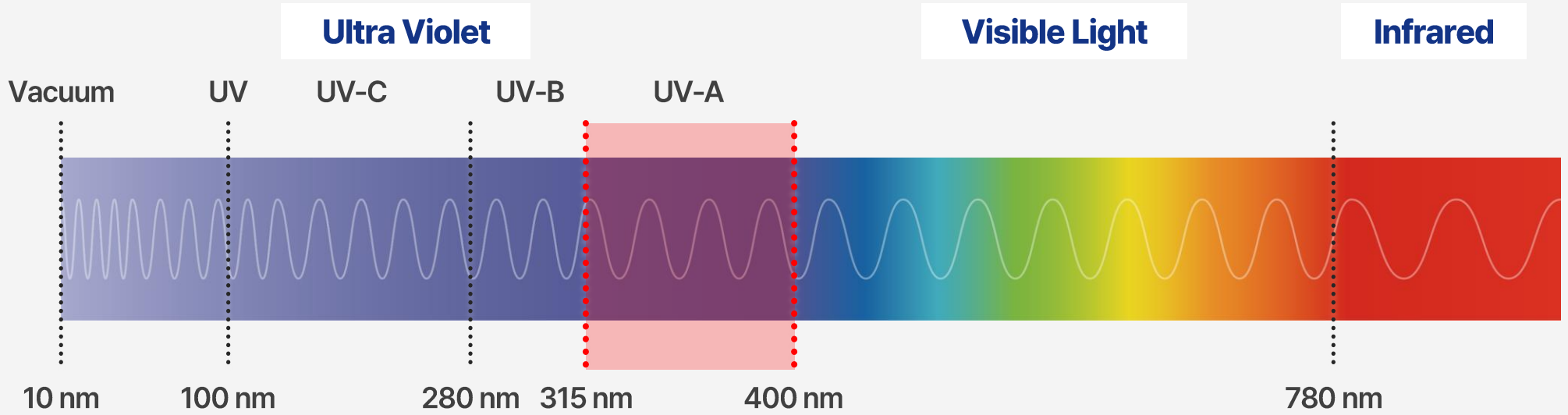


Limitations of Red Ocean Titanium Dioxide(TiO_2)

- TiO_2 absorbs UV-A wavelength generating OH Radicals
- OH Radicals are powerful oxidizing agents **decompose organic matter** and inactivate viruses making them widely used in purification, sterilization and deodorization markets.

Degussa의 P25,
White TiO_2

Limits Activation only in the UV-A range among the full spectrum of light



Game-changer in catalyst market: Raven VLC(Visible-Light-Catalyst)

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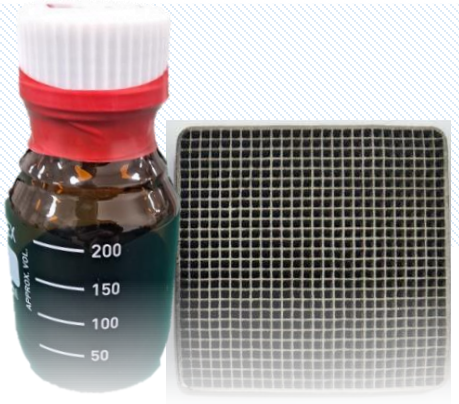
- Overcoming absorption limitation of TiO_2(365nm) → Activation across **full visible-light spectrum** <400~780nm>
- Currently at TRL-4, validation completed by accredited institution
- The world's only true Visible-Light-Catalyst at the final stage right before commercialization

  (Effective under indoor lighting, near-infrared(red-spectrum) and sunlight)



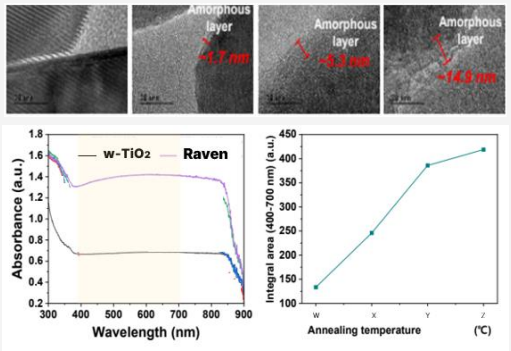
Core-tech Verification status with patents and Know-how

Validation 1

Much higher light absorption rate!

Nano sized amorphous surface (SEM/TEM)

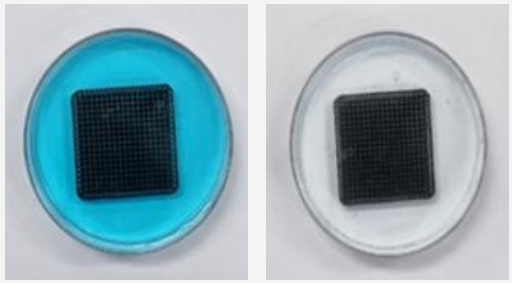
Verified properties



Validation 2

OH Radical makes Methylene-Blue solution into transparent under indoor LED (2.5m height)

Verified under indoor light



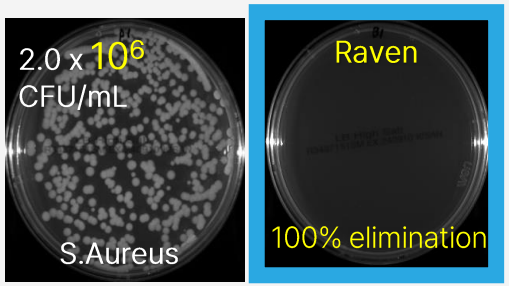
30min 210min

Validation 3

Antibacterial test, 100% kills of S.Aureus

With natural visible light (10 minutes exposure)

100% antibacterial



Validation 4

Airborne virus reduction test (with Awear)

96% kills virus in 60CBM in 30 minutes

96 kills with visible light

40x energy efficienct

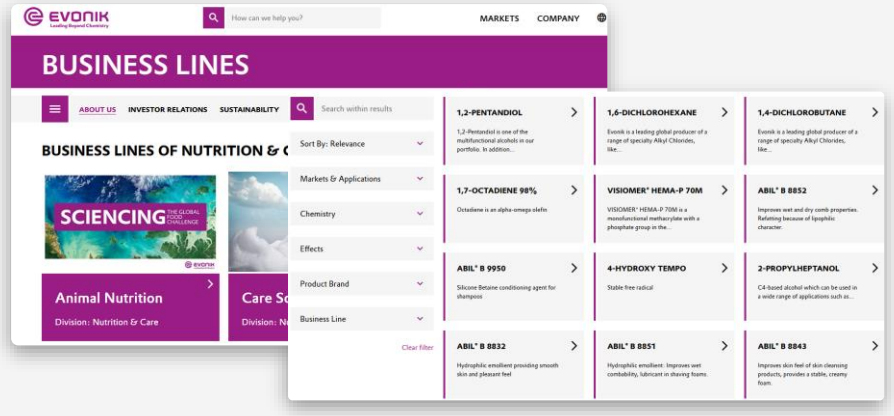
Interests from global leading companies(Chemicals, glass, film, appliances, HVAC)

- Active R&D efforts on doping-TiO_2, core-shell TiO_2 → to improve light absorption efficiency
- Various VLC tech attempted, including Pt-WO_3, ZnO, CNT → None could achieve full-spectrum visible light absorption
- World's first invention, **Raven's limitless scalability** as the only catalyst activated across the entire visible light spectrum

Application Joint R&D and PoC status

EVONIK

- HQ in Germany
- €15.3Bn revenue in 2023
- 32,000 employees
- Business: Adhesion, TiO_2 catalyst
- Application: Construction, vehicle, medical, energy, etc.



Raven, a game-changing tech will redefine the photocatalyst market,
is a core material capable of coating in various forms-even **majors cannot easily replicate**

PoC ①

LX글라스

Visible light catalyst glass

Self-cleaning / indoor air quality improvement / insulation

PoC ②

enercare

Heating/cooling HVAC

Indoor air sterilization/deodorization of moldy smells and odors

PoC ③

3M

Visible light catalyst film

Self-cleaning / indoor air quality improvement
for window and interior film

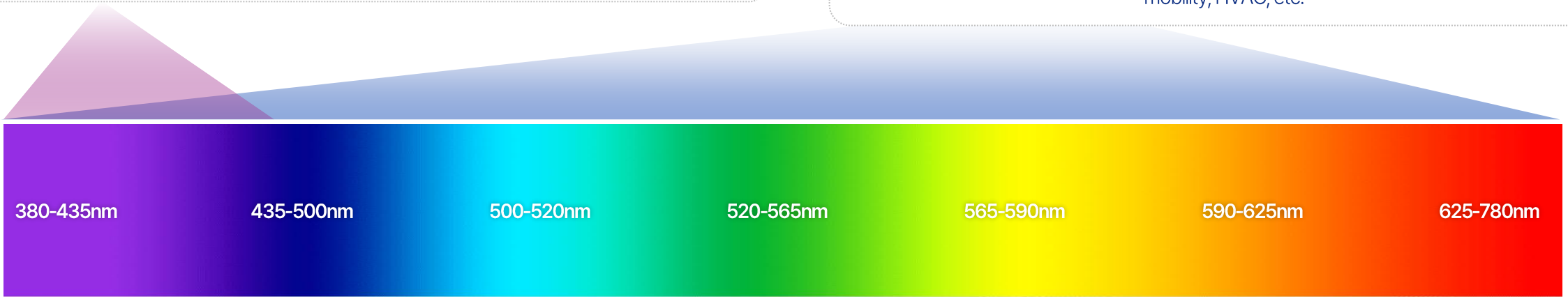
Our position to activate with full-spectrum of light

R&D in progress of core-shell TiO_2

- To absorb 465nm(blue) Vis-light with core-shell TiO_2
- Heterogenous or doped-TiO_2
- Air purification, health care, greenhouse, etc.

VLC TRL 4 → 5 (Raven invented and proved)

- It absorbs 365-780nm(near-infrared)
- Newly modified chemical structure
- Air/water purification, energy efficiency, building /construction materials, industrial coating, agriculture, mobility, HVAC, etc.



UV + TiO_2 manufacturer

- Standard white TiO_2 absorbs 365nm(UV-A)
- It needs additional UV equipment to activate white-TiO_2.
- Paint, plastic, pigment TiO_2, industrial coating, etc.

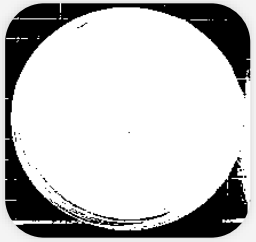
Application status as for now

Coating Coating techniques & performance validation for real-world application of Raven

Example ① Ceramic Block coated with Raven material

① TiO2 coating

② Confidential



③ Raven

④ Filter (AirShield5.0)

Indoor air sanitizer (for UAE export)

Example ② HEPA filter coated with Raven material

① Raven powder/solution

② Dip Coating and treatment

③ Before/after Raven coating

Applying to automotive ventilation filter for removing VOCs, NO2, SO2, moldy smells.

Challenge for B2B commercialization and validation in 2025

Challenge Coating techniques tailored to requirements of demand companies

① Film

In progress

3M

Window / interior film

- Advancement of low-temperature manufacturing process
- Raven film can be utilized in construction, automotive, medical and industrial applications
- Currently developing chemical processes for film applications

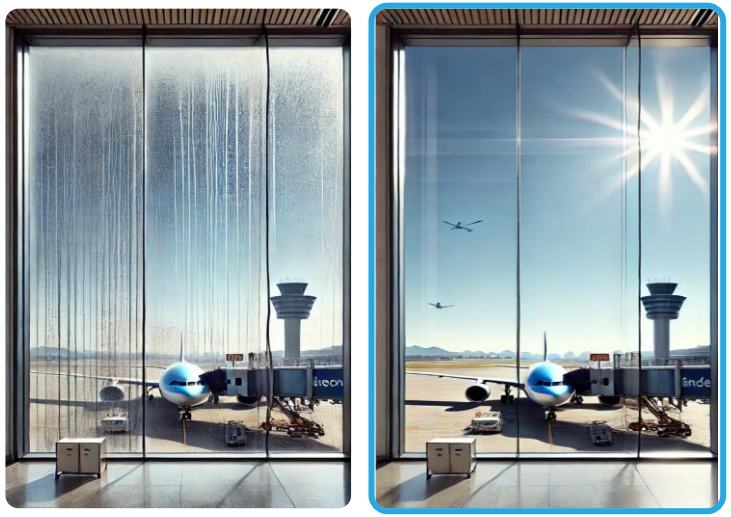
② Glass

In progress

LX글라스

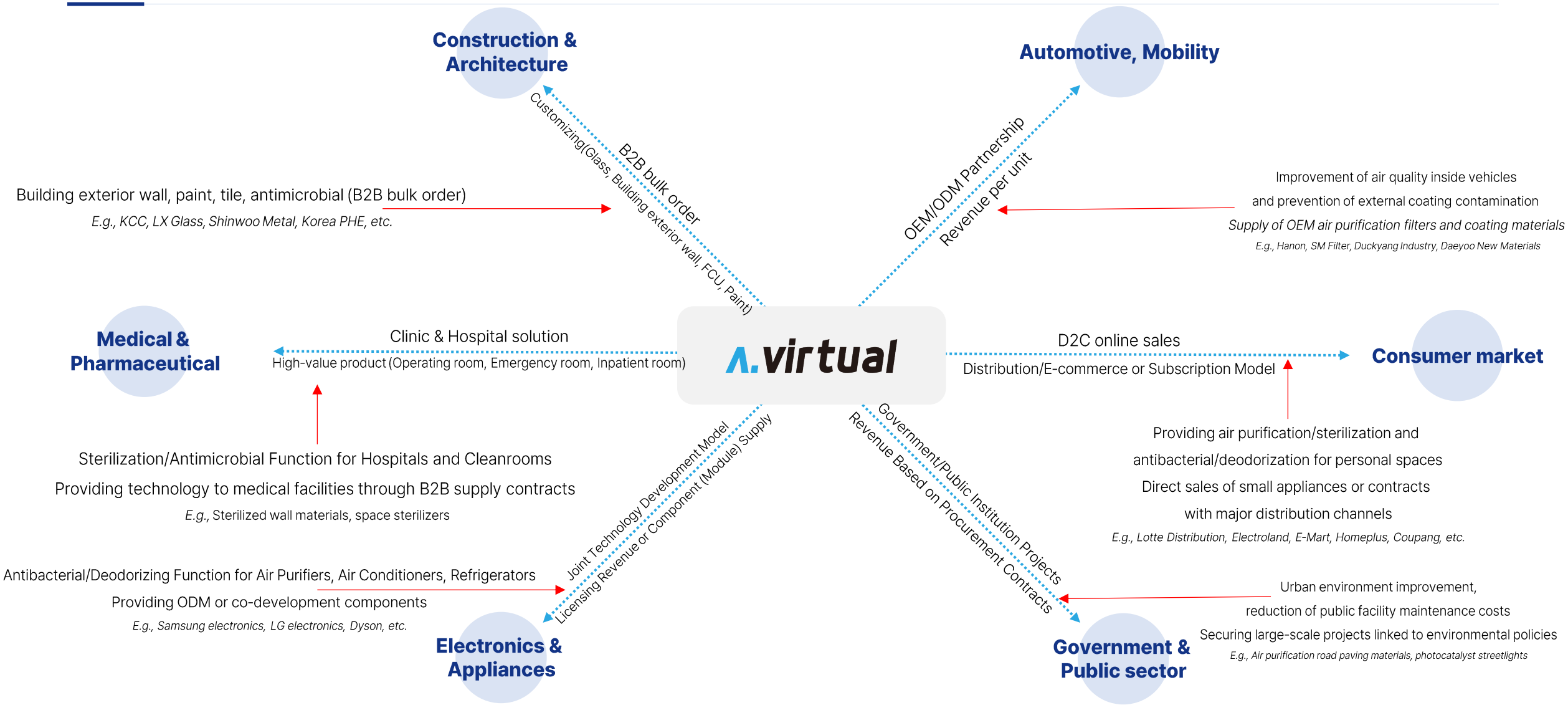
$850K
(First sales expected after PoC in 2025)

Existing glass ▶ Raven glass



- Advancement of glass surface coating tech for Raven
- Raven glass is self-cleaning exterior / air purification on interior
- Currently selecting binders, solvents, and other chemical/material components for glass coating applications

B2B : Tier2 supplier model & D2C model of customization



Expert collaboration in materials, chemistry and global business

Founder & CEO
Taejun Dylan Kim

Operations & Global expansion

6y, COO / founding member of BA ENERGY
2y, Regional BM developer in India
Energy-saving micro&nano materials expert

CTO Ph.D. Inorganic material
Hwamok Kim
250 patent, 131 papers

Head of R&D / IP management

15y, Head of R&D, Seoul semiconductor & Seoul viosys
Professor of photo semiconductor
Commendation by Ministry of economy - 2024

VP / COO
Sangwook Lee

Global sales & business development

Samsung Galaxy, Product Owner
17y, Director, Head of Product in IM/MX division (SAMSUNG Gulf)

Advisor to the CEO
KH Kim
Ph.D. Chemistry, 26 papers, 5 patent

Photo semiconductor (chemistry)

Senior researcher at G-institute (S.Korea)
Post doctor at Harvard medical school
Post doctor at Massachusetts general hospital

CRO / M.Eng. New material engineer
Sinhye Kim

4y, senior researcher, bio materials based on Ti-x chemical reaction
3y, SEM/TEM analysis of nanomaterials and nano island coating
Head of strategic planning of Research

CFO / polymer material engineer
Hansol Lee

3y, senior researcher, PCM material for zero energy building
3y, nanoparticle coating validation for Raven material
Inter-control and finance based operation

Raven (advanced material)

We invite you to join our vision of purifying the Planet by applying Raven to every space with light

Sustaining the Planet with advanced material and light

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