Technology Transfer Brief

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A Structure-Guided Vapochromic Platform for Visual Detection of Hazardous Gases

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Content

01 Gas Safety Is a Perception Problem, Not Detection

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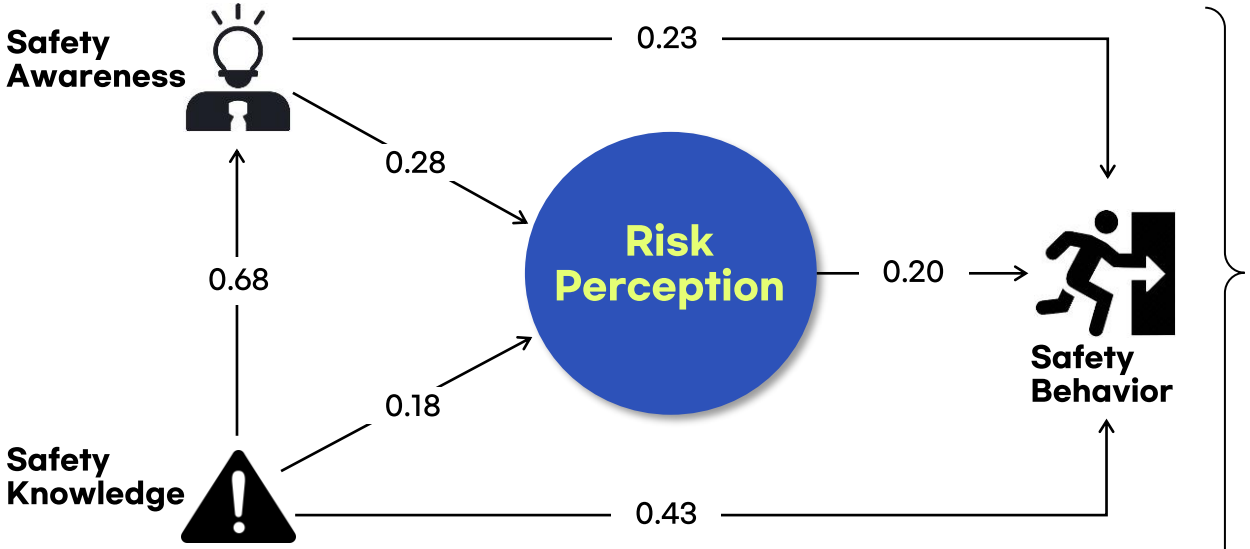
- ✓ **Invisible hazards lack perceptual interfaces, causing systematic failures in on-site safety behavior.**
- ✓ **Innovation direction :** Perception-driven and spatially visualized safety.

(*Standardized path coefficients (β, **SEM**)



- **Risk Perception Gate Model** : Safety knowledge and awareness alone cannot drive stable behavior without sufficient risk perception.
- Risk perception acts as a gate variable for behavior, which is **structurally weakened in invisible hazard environments** such as gas exposure.

(*Source: Esmaeili *et al.*, Scientific Reports, 2025)

① **Perception-First Interface**

- Enhance immediate risk perception in invisible gas environments.
- Visual cue, immediate recognition, no numerical interpretation required.

② **Spatial & Shared Visibility**

- Enable shared and spatial risk awareness.
- Space-level visibility, multi-user awareness, passive perception.

Gas Sensors (Monitoring system)

Quantitative gas concentration measurement.

- Numeric, non-intuitive output
- Centralized alerts, low human salience
- Limited spatial awareness

Personal Gas Detector

Individual-level exposure alert.

- User-dependent (wearing/compliance)
- Alarm fatigue
- No area-level risk sharing

Training & Sign (Manual based)

Information-based safety awareness.

- Static, non-contextual
- No real-time feedback
- Awareness-action gap

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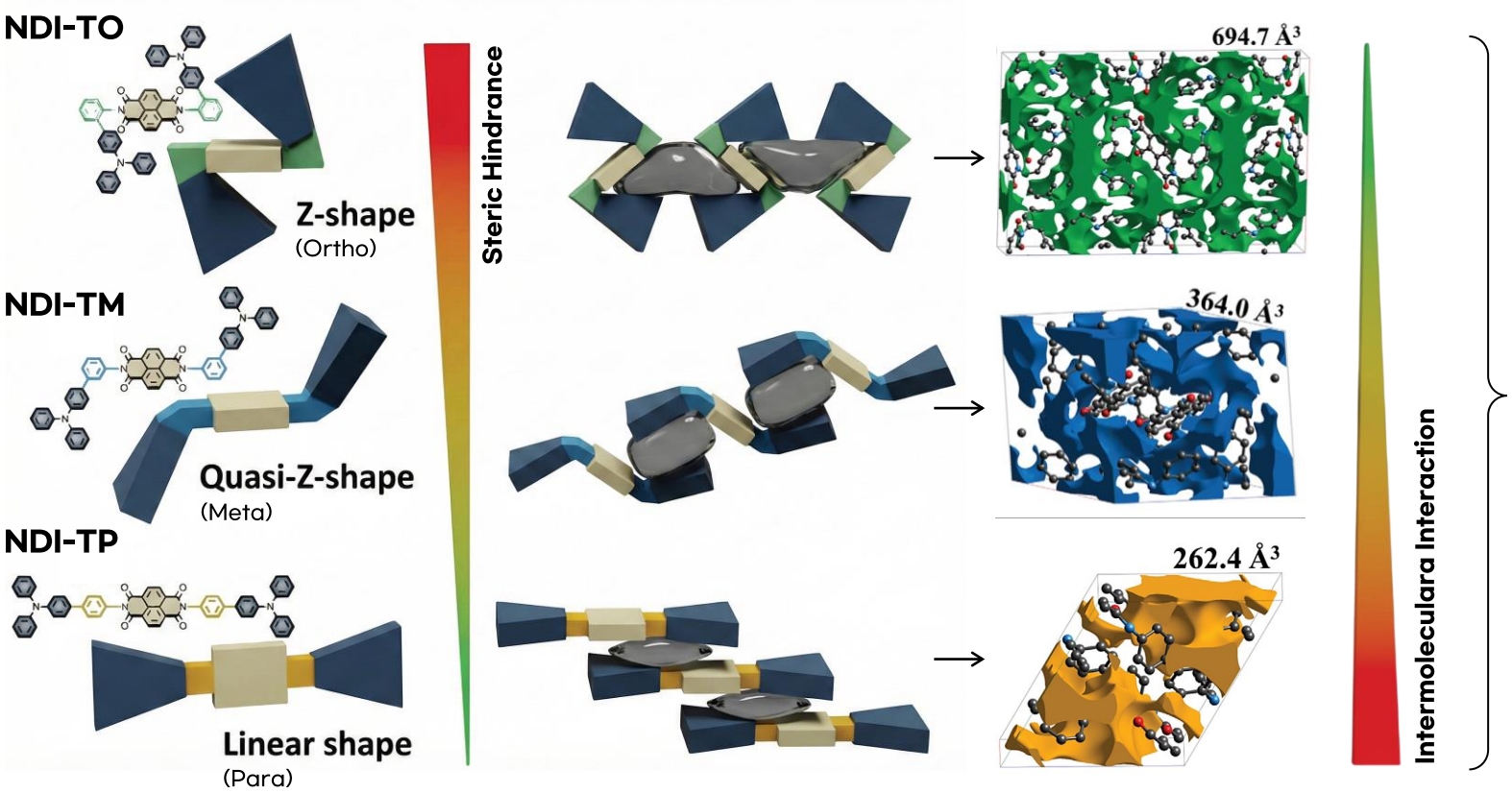
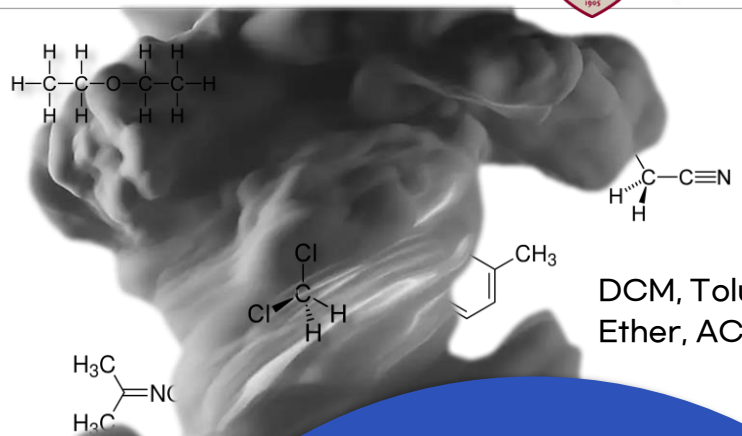
02 Technology Overview

- ✓ **Structure-Guided Control of Molecular Architectures.**
- ✓ **Functional Responses :** Molecular architectures engineered through structural control enable distinct functional responses to hazardous vapors.





Functional Responses to Hazardous Vapors

① GAS

Sensitive Hazardous Vapor Detection

- Early hazard warning
- Broad vapor sensitivity
- Intuitive visual response

②

Selective Recognition

- Targeted selectivity
- Molecular discrimination
- Reduced false positives

- **Positional isomerism modulates** molecular shape and packing in the solid state.
- **Void size and geometry serve** as key parameters for tunable molecular architectures.

03 Key Features & Advantages

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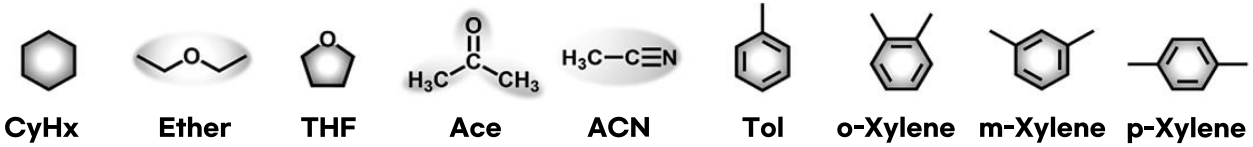
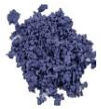
- ✓ **Technology Value :** Structure-guided molecular sensing enables **tunable** and **selective** vapor recognition.
- ✓ **Safety Impact :** Invisible gas hazards are transformed into **immediate visual safety** cues.





❶ NDI-TO

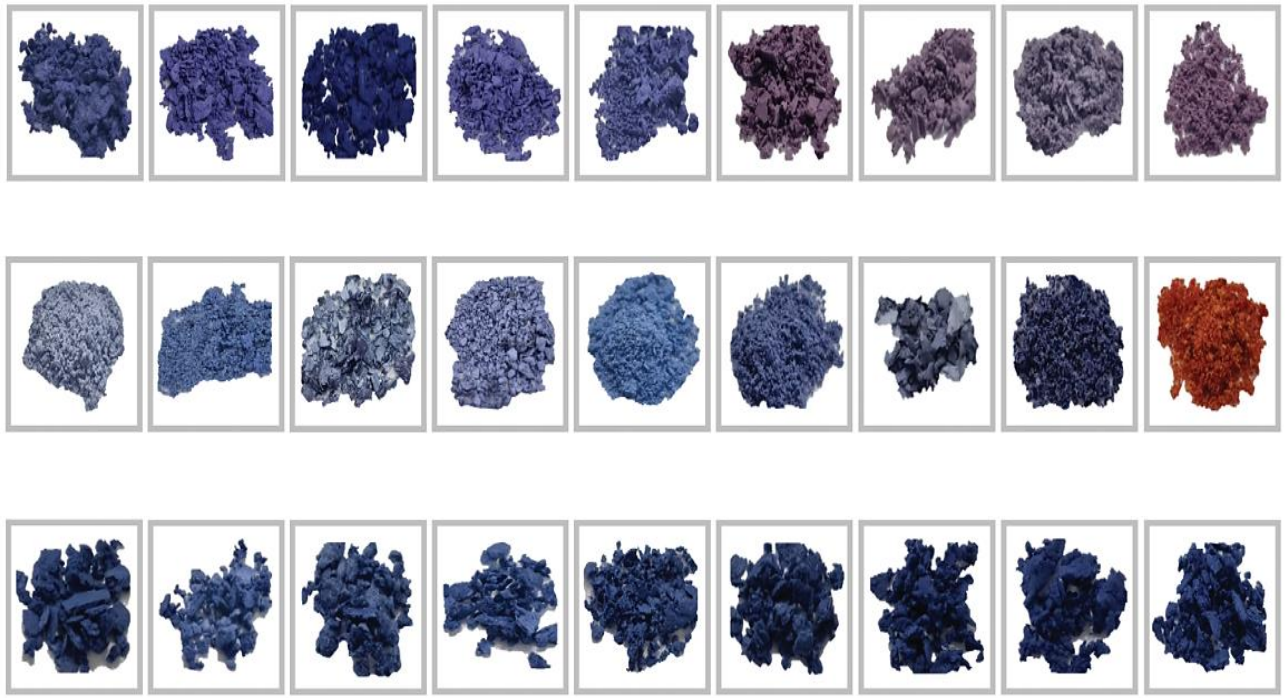
- Responds broadly to diverse vapors.
- Early warning, wide-area hazard indication.

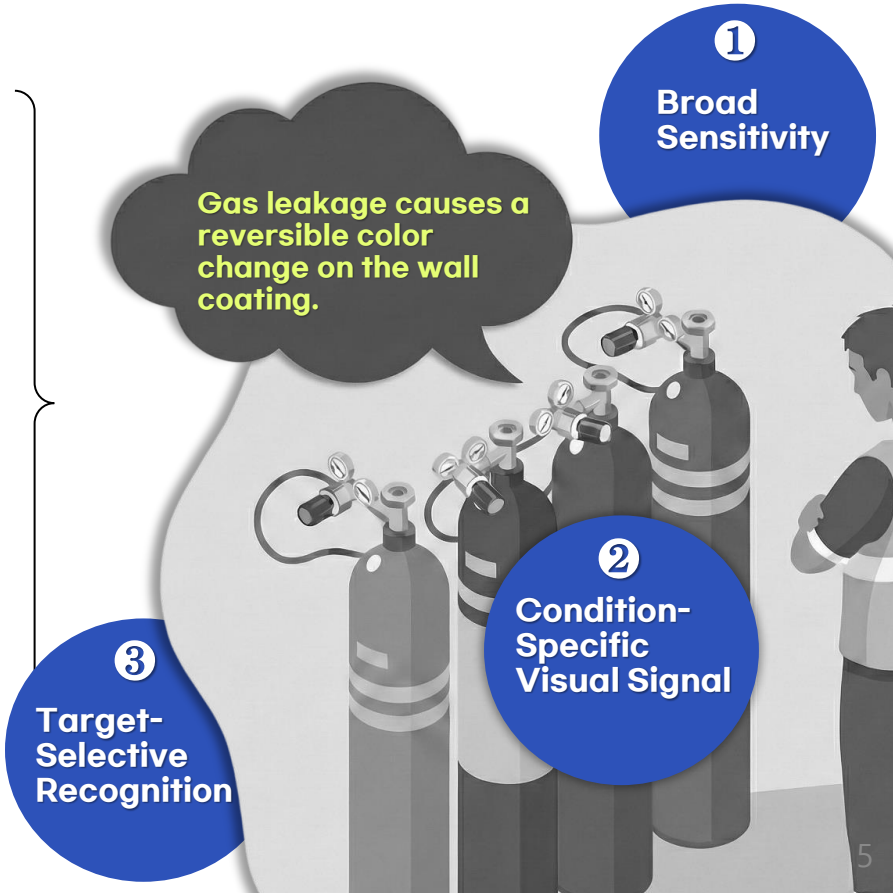
❷ NDI-TM

- Differential / condition-specific response.
- Threshold-based alert, visual marker in sensing arrays.

❸ NDI-TP

- High target-specific selectivity.
- Targeted VOC monitoring, minimized false positives.





04 Strategic Business Opportunities

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- ✓ **Business Vision :** A structure-guided, colorimetric sensing platform that transforms invisible gas hazards into immediate visual safety cues across real-world environments.
- ✓ **Engagement Model :** Technology licensing and application-specific co-development partnerships.

Collaborative development opportunities

❶ Application & Scenario Expansion

- Customization of colorimetric responses for different hazardous gas classes. (VOC, solvents, industrial gases)
- Design of broad-sensitivity, condition-specific, or target-selective sensing modes.

❷ Application-Specific Validation

- Validation under realistic leakage and exposure scenarios.
- Evaluation of reversibility, response speed, and visual distinguishability.
- Field-oriented testing in confined or open environments.

❸ Scalable & Deployable Platform Framework

- Coating- or film-compatible material integration.
- Scalable fabrication for large-area deployment. (walls, panels, enclosures)

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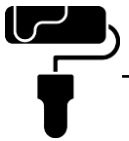
Collaborative R&D

- Manufacturing & Deployment R&D (Standardization and scalable deployment)
- Application & Field Validation R&D

IP license (Option/Exclusive)



consumable supply

Chemical facilities

Industry partners

- Safety coating & paint manufacturers
- Industrial material suppliers
- Environmental sensing solution companies

End users

Intellectual Property

- Title : NOVEL VAPOCHROMIC ORGANIC MATERIAL FOR DETECTION OF VOLATILE ORGANIC COMPOUND.
- Patent : US 19/280733, KR 10-2024-0072430

CONTACT US

For inquiries regarding technology licensing, collaborative R&D, or partnership opportunities, please contact :

- Technology Transfer Agency : **IBU Inc.**
- Email : **kimth@ibubiz.kr**

Partnering to unlock new business opportunities through innovation.

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