

Cursory overview of R&D Products

Bi₂O₃ adsorptive type smoke and NO_x sensors for multi-sensor system solutions



(Patented in Armenia, the first modification was patented in US); the second modification of the product was developed under ISTC funding.

US Patent authors of the first modification of the product:

V.M. Aroutiounian, Z.N. Adamian, H.V. Abovian, K.R. Movsessian, A.A. Barseganyan, M.S. Panossian

Armenian Patent authors of the second modification of the product:

A.Z. Adamyan, Z.N. Adamian, V.M. Aroutiounian, H.V. Asriyan

Advantages: The product is most effective in fire detection at early stages of smoldering and can be extremely useful in multi-sensor solutions.

Main applications:

- Home security systems
- E-noses

Other applications:

- Dwelling houses and apartments, hotels, hospitals.
- Specialized installations:
- Military and civil warehouses, depots, aircrafts hangars, plant facilities.

- Elevator (wells) and communication lines shafts of high-rise buildings, underground communication lines, subway systems.
- Aircrafts and ships
- Ecologic monitoring of environment. It can provide ecol. monitoring of forests on high altitudes in intensive areas of pass of Wind Rose

✓ **Nanocrystalline SnO₂ thin-films based sensors for hydrogen and CO detection**

(Patented in Armenia)

Armenian Patent authors:

A.Z. Adamian, Z.N. Adamian, V.M. Aroutiounian, A.H. Arakelyan, K. Tourian, J. Turner

Advantages: The key advantage of the product is workability of the sensing element at **near-room temperatures and high sensitivity to H₂ and CO gases**, ensures high security at hydrogen detections, exhibits selective sensitivity to CO at other operational temperature regime.

Main applications:

- Fuel cells
- Hydrogen propelled/integrated critical infrastructure and autonomous systems monitoring, leakage detectors
- Home security systems, E-noses



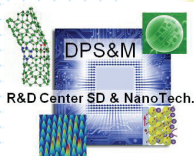
Portable pen-type hydrogen leakage detector

Authors: A.Z. Adamian, Z.N. Adamian, V.M. Aroutiounian

This Hydrogen Leak Detector is based on the nanostructured metal-oxide thin-film hydrogen sensor.

Possible applications: automatic explosion preventing systems; rocket engines check; hydrogen-fueled automobiles safety; explosion monitoring of powerful electric accumulators and generators; reliable leak test and tightness control of large and heavy profiled constructions aimed for vacuum systems, different gas equipments and instruments, etc.

The **portable pen-type hydrogen leak detector** can operate in autonomous regime from battery (14 hours of run-time) as well as can also be run continuously from the battery charger (including ones for mobile phone).



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✓ Hydrogen photolysis cell on the base of titanium-based nanotubes (Know-how)

Know-how authors

V.M. Aroutiounian, V.M. Arakelyan, E.A. Khachatryan, G.E. Shahnazaryan

Advantages: durable and one of the most effective in this kind of devices.

Main applications

- Solar Plants
- Hydrogen generation plants

✓ Porous silicon – metal oxide tandem structures for Hydrogen and other hazardous gases sensing including CO (Patented in Armenia)

Armenian Patent authors:

V.M. Aroutiounian, V.M. Arakelyan, V.E. Galstyan, Kh.S. Martirosyan, H.V. Asriyan, P.G. Soukiassian

Advantages: The key adv. of the product is **multi-sensor solution realized on single crystal chipset platform** able to detect hydrogen and various hazardous gases with controlled sensitivity

Main applications

- Security multi-sensor solutions
- Environment monitoring systems

✓ Hydrocarbon gases sensors (Know-how)

Know-how authors:

V.M. Aroutiounian, V.M. Arakelyan, V.E. Galstyan, Kh.S. Martirosyan, G.E. Shahnazaryan

Advantages: Low cost, high-sensitivity sensors

Main applications

- Home security systems
- Gas pipelines monitoring systems

✓ ZnO based nanosensor (Know-how)

Know-how authors:

V.M. Aroutiounian, V.M. Arakelyan, V.E. Galstyan, G.E. Shahnazaryan

Advantages: Highly sensitive Hydrogen sensor

Main applications

- Fuel cells
- Home security systems, E-noses
- Hydrogen propelled/integrated critical infrastructure and autonomous systems monitoring

✓ Porous silicon, diamond-like carbon and silicon oxynitride antireflection coatings for silicon solar cells

✓ (2 Patents in France)

Both French Patents authors:

V.M. Aroutiounian, Kh.S. Martirosyan, P.G. Soukiassian

Advantages: provides lower light reflectance (less than 5%) in the 400-800 nm range, significantly increasing the efficiency of silicon-based solar cells.

Main applications: solar cells

Additional information including relevant publications is available upon request.