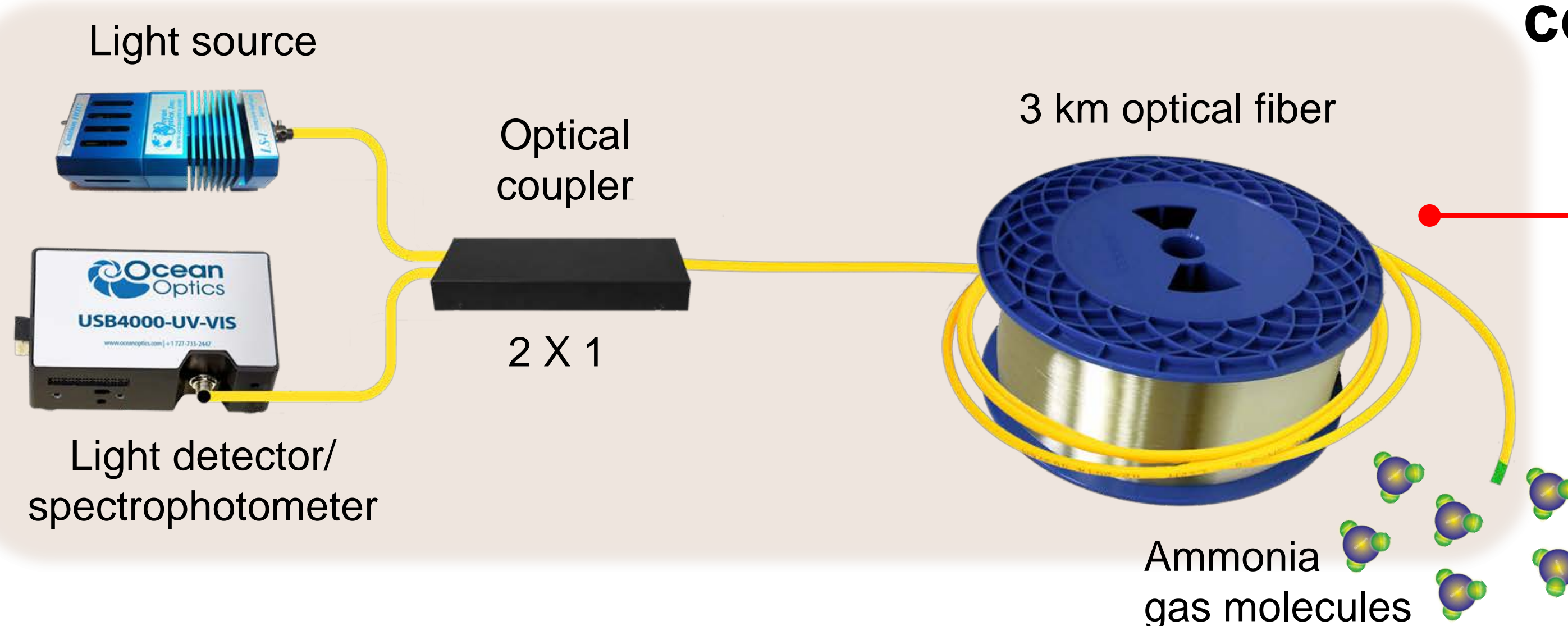


AMMONIA GAS SENSOR USING TAPERED OPTICAL FIBER COATED WITH ZINC OXIDE NANOSTRUCTURES

PATENT NO. PI 2016700567

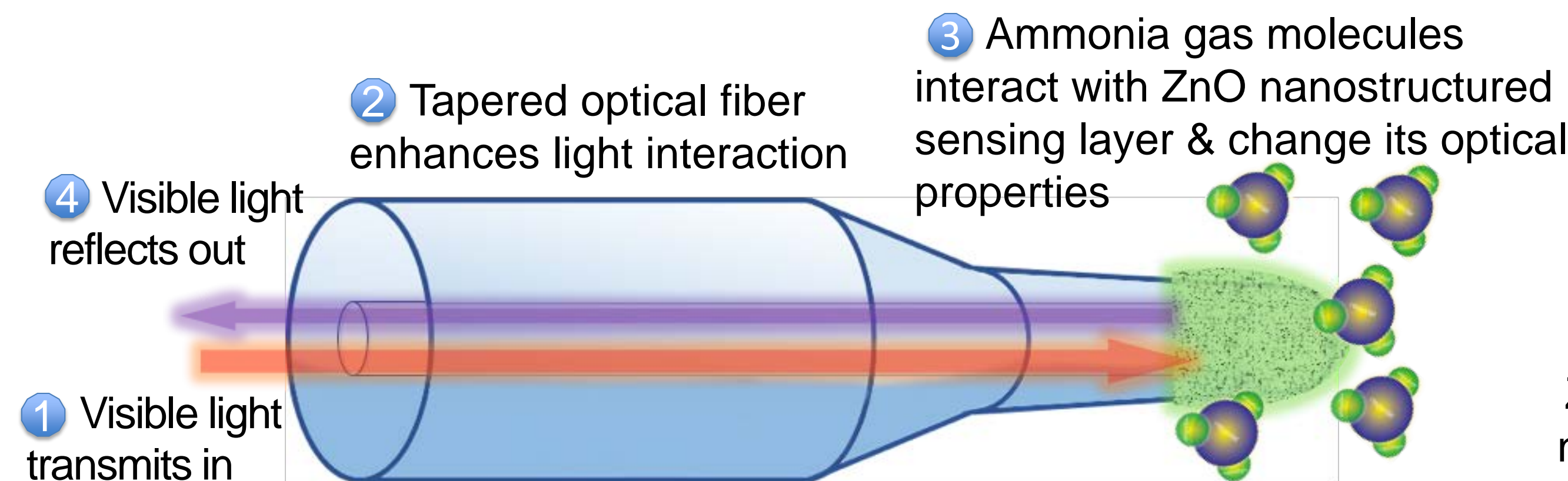
INVENTION

Remote ammonia optical sensor



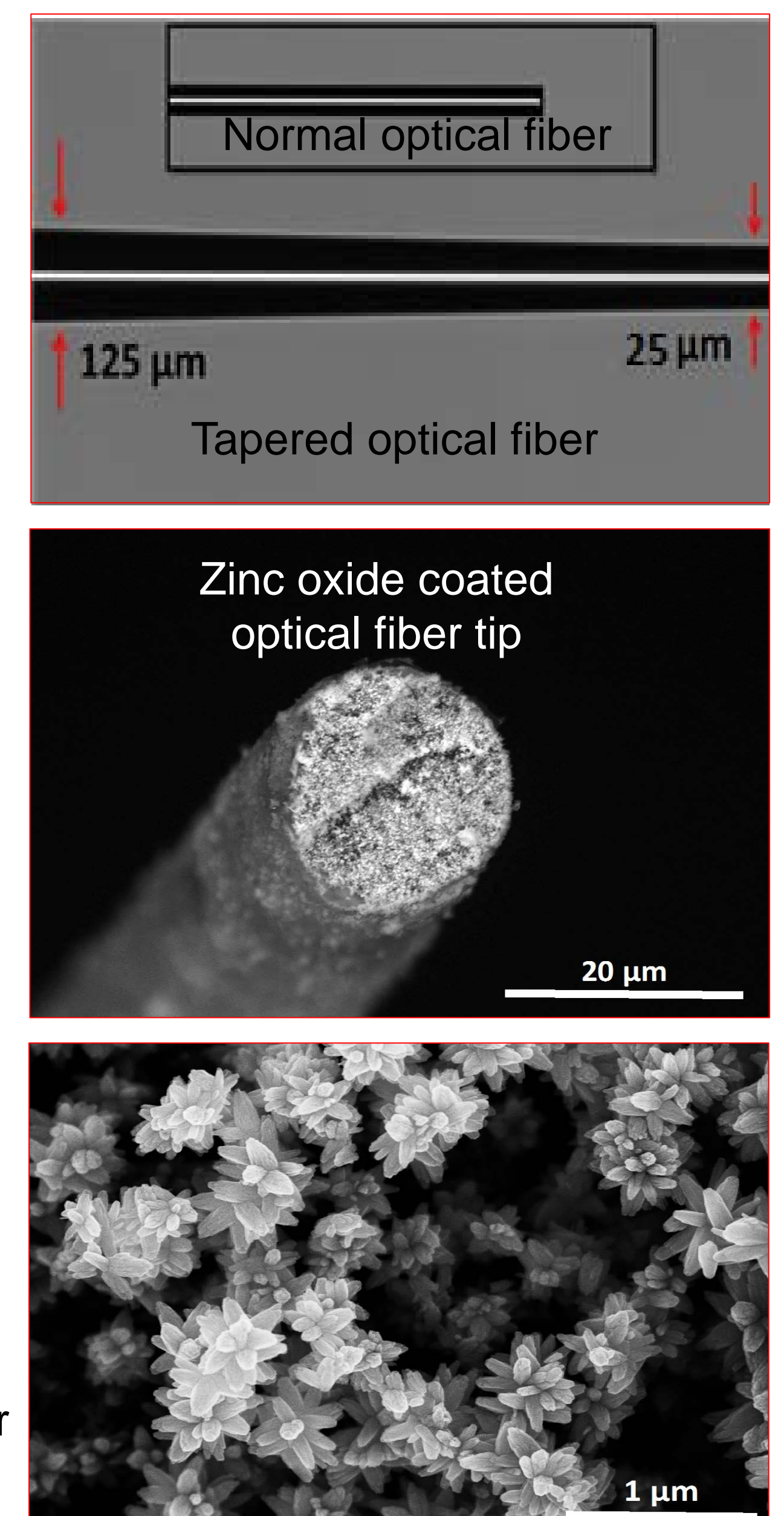
PRINCIPLE

Combining light and nanotechnology, ammonia (NH_3) sensor was developed by integrating tapered ('modified') optical fiber with zinc oxide (ZnO) nanostructures as the gas sensing layer.



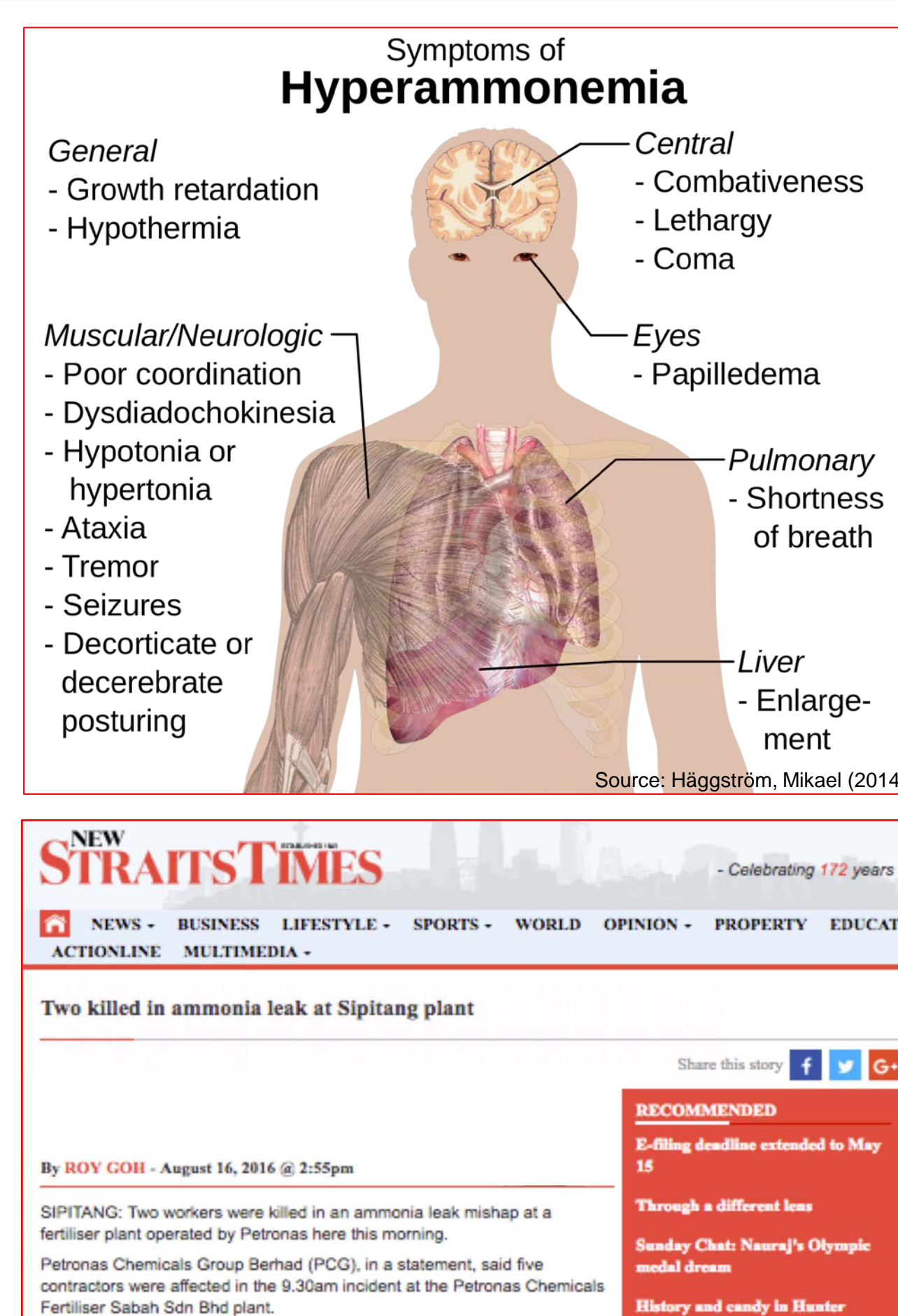
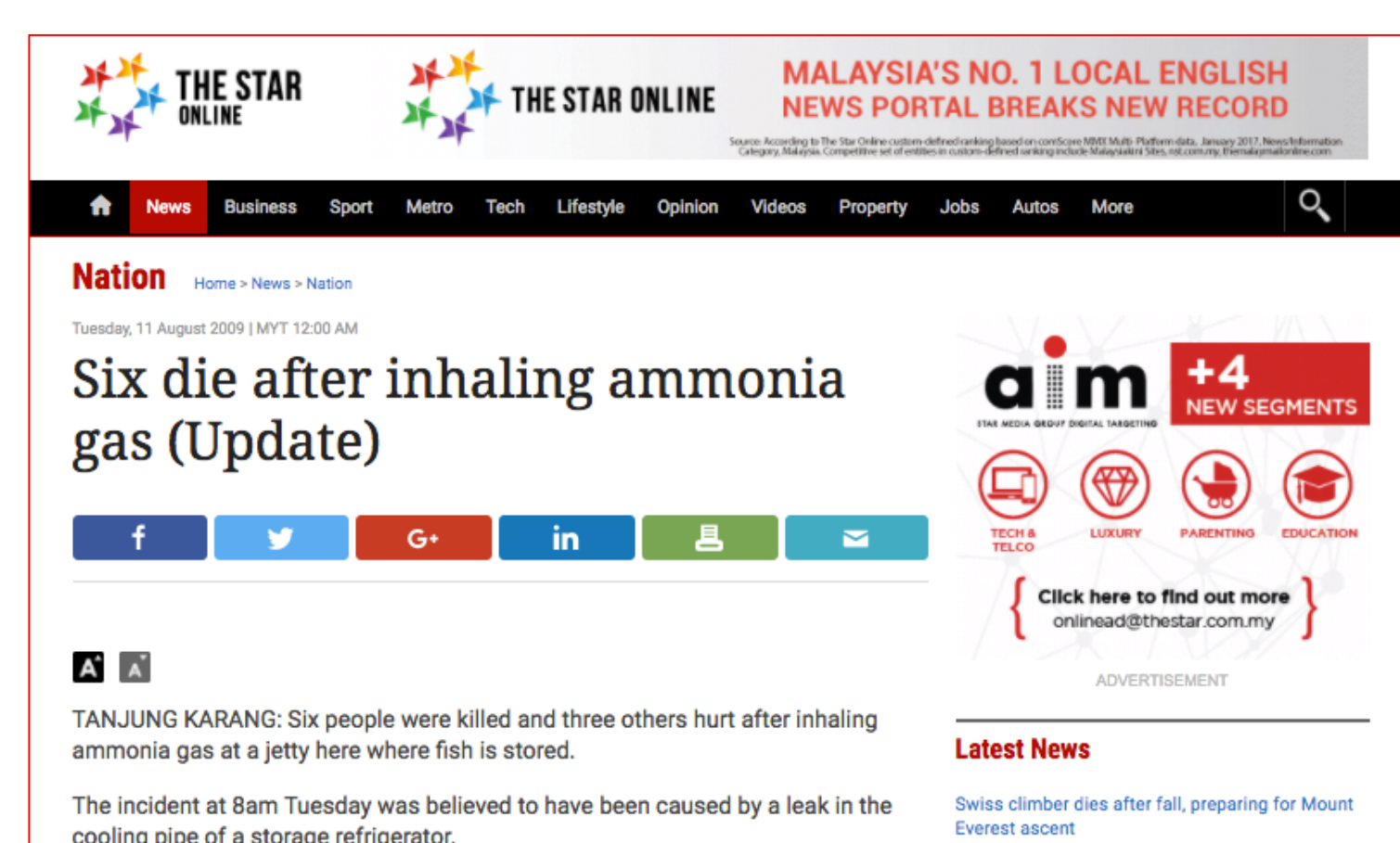
PROTOTYPE

Tapered optical fiber coated with zinc oxide nanostructures

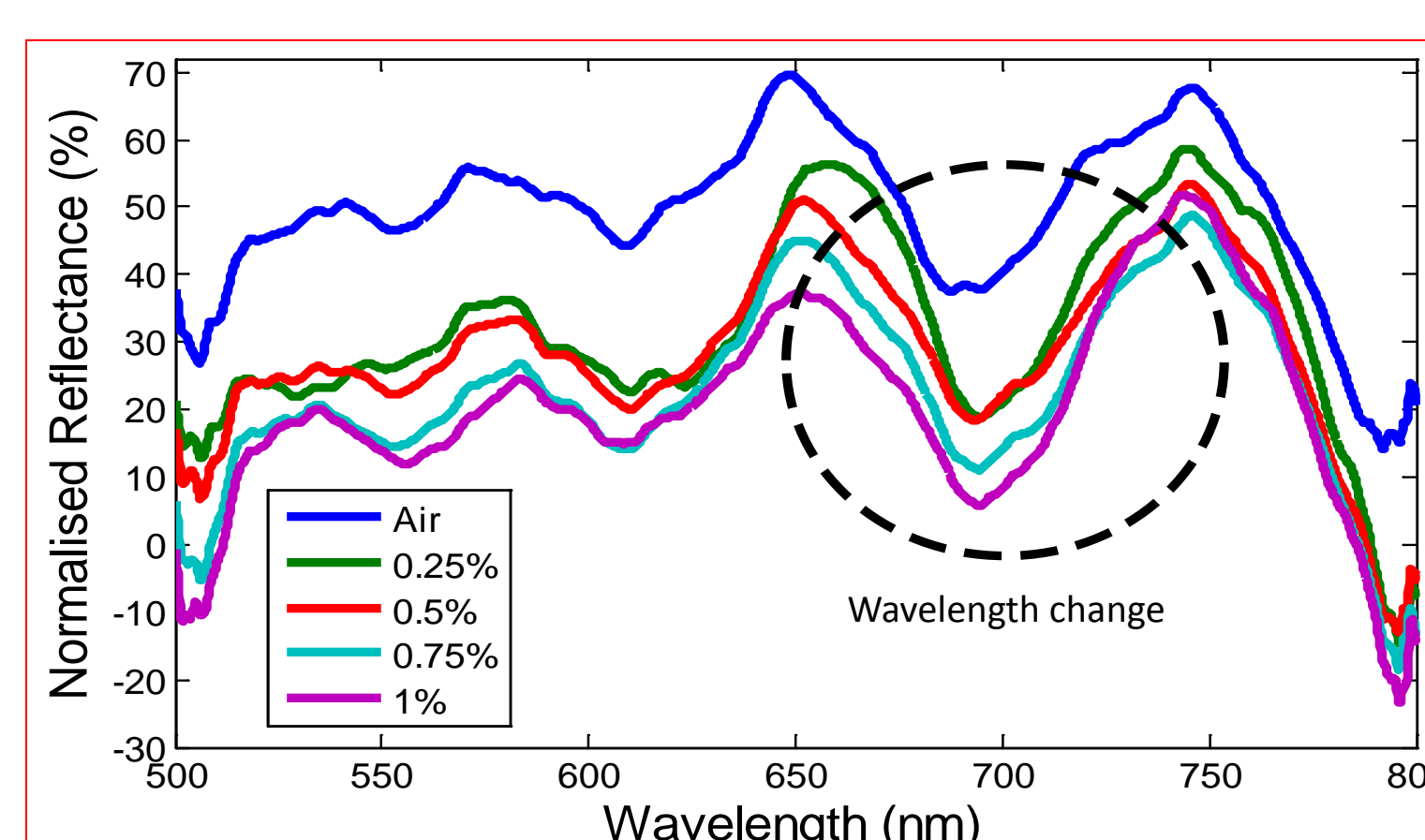


NEED

Ammonia is widely used gas with a strong smell and high toxicity. The inhalation of this gas is deadly. Many fatal accidents are reported annually due to the ammonia leakages.

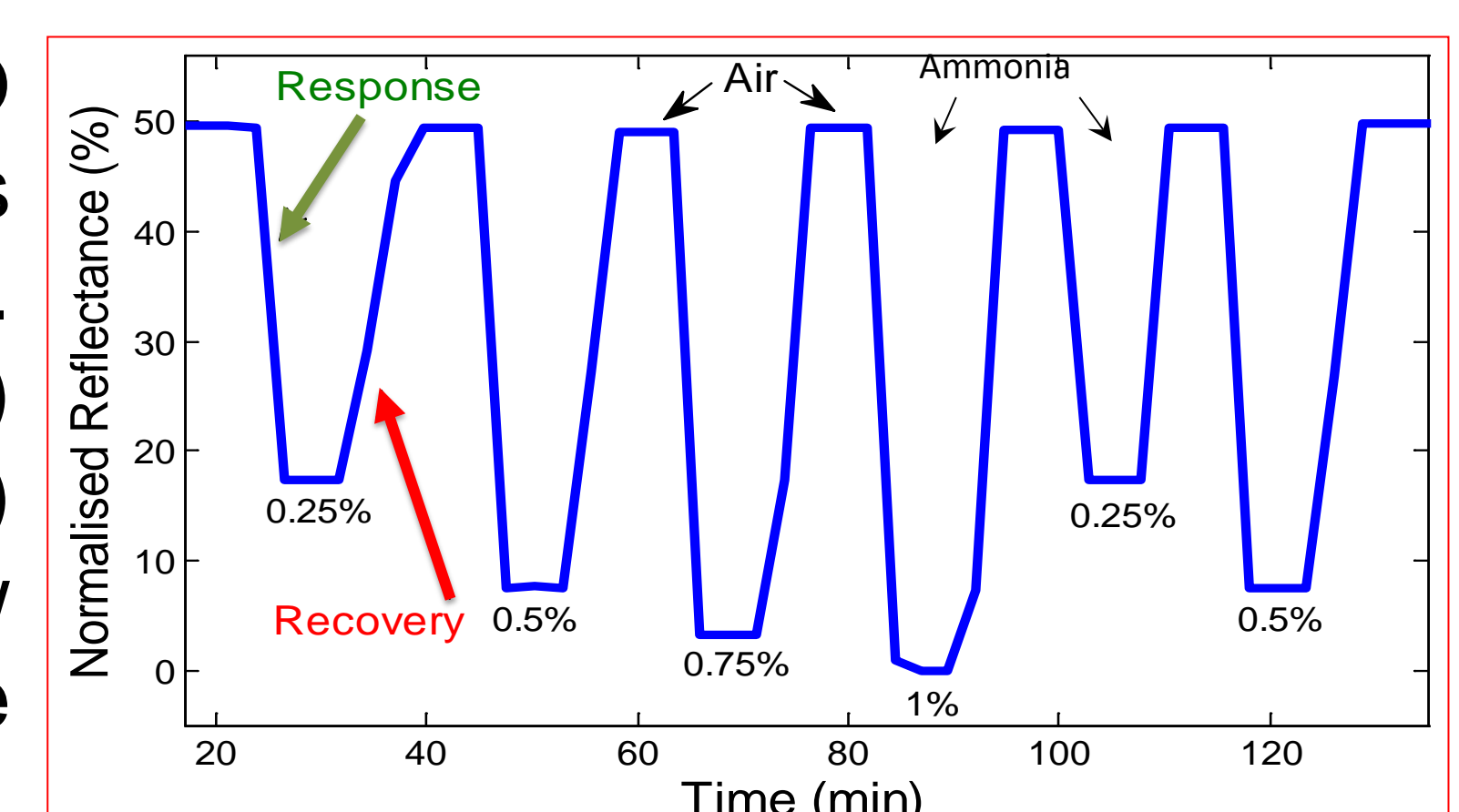


AMMONIA OPTICAL SENSOR RESPONSE



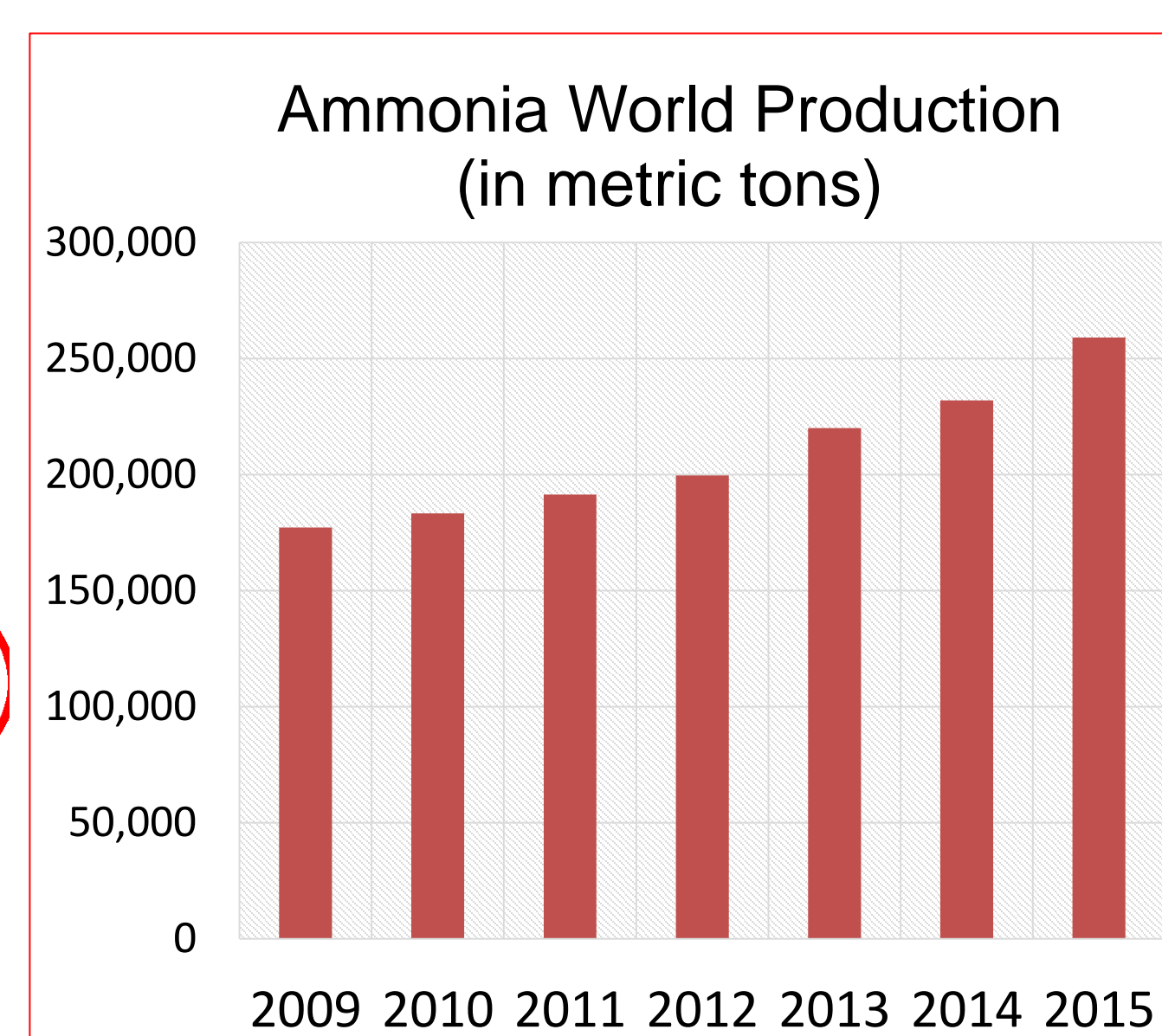
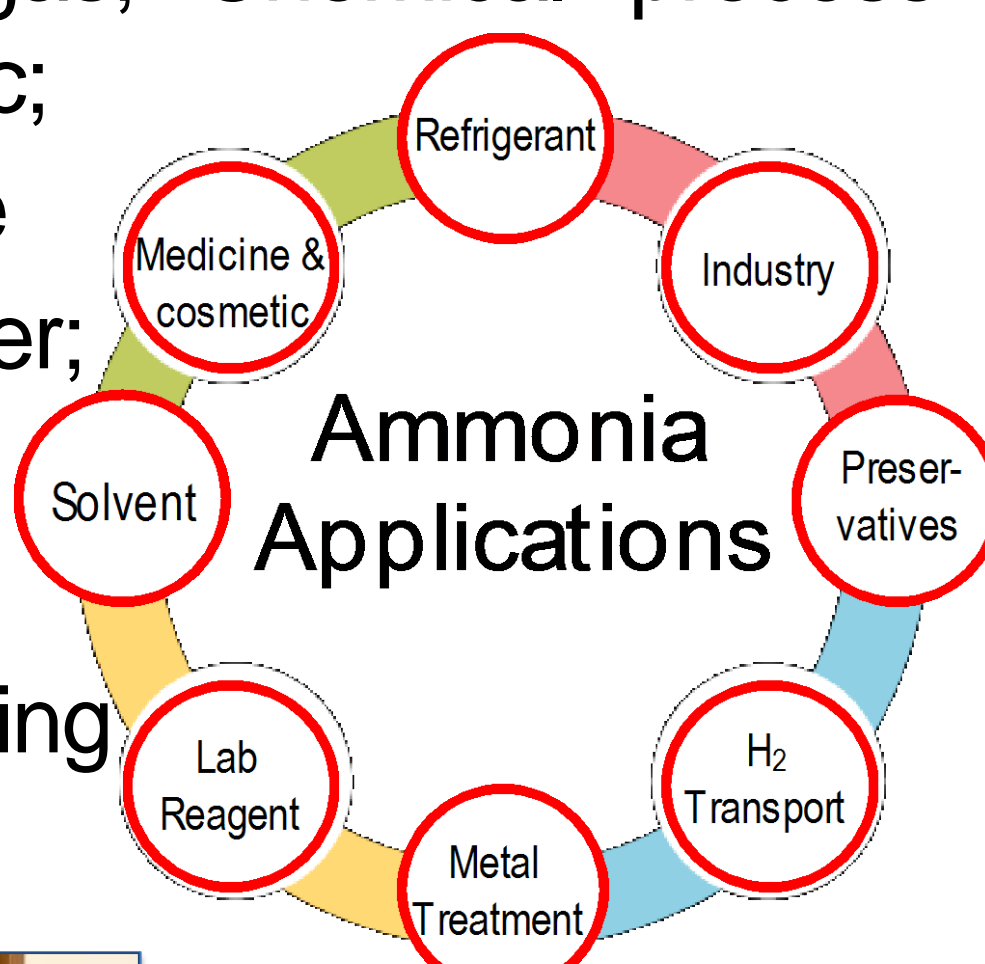
Tapered optical fiber sensor changes its intensity (reflectance) proportionally when exposed to different ammonia concentrations.

High surface area of ZnO nanostructures improves molecules interaction. Very fast response (60 s) and recovery (70 s) achieved at low temperature for remote optical fiber cable (3 km).



MARKET POTENTIAL

Remote environmental monitoring; Oil and gas; Chemical process and logistic; Agriculture and fertilizer; Pharmaceuticals and cleaning industries.



*2016 Ammonia market price is typically USD300/ton Source: SEC 2016

ADVANTAGES & STRENGTHS

Lightweight; Immune to electromagnetic interference (EMI); Suitable for volatile & flammable environment; Suitable for remote monitoring system (approx. 3 km); Room temperature operation; Energy saving; Competitive cost; High sensitivity and selectivity; Fast response and recovery (<one minute).

COMPETITOR TECHNOLOGY

Localised electrical sensor; Prone to EMI; Poor selectivity; High operating temperature (100 - 300°C); Limited environment.



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