

Supplementary Materials

Construction of Rutile-TiO₂ Nanoarray Homojunction for Non-Contact Sensing of TATP Under Natural Light

Yan Tang ^{1,†}, Yuxiang Zhang ^{2,3,†}, Guanshun Xie ¹, Youxiong Zheng ¹, Jianwei Yu ¹, Li Gao ^{1,*} and Bingxin Liu ^{1,*}

¹ Qinghai Provincial Key Laboratory of New Light Alloys, Qinghai Provincial Engineering Research Center of High Performance Light Metal Alloys and Forming, Qinghai University, Xining 810016, China; a1172050909@163.com (Y.T.); zyxustc@mail.ustc.edu.cn (Y.Z.); guanshunxie@126.com (G.X.); youxiongzheng@126.com (Y.Z.); yjw13897471771@163.com (J.Y.)

² Key Laboratory of Materials Physics, Institute of Solid State Physics, Chinese Academy of Science, Hefei 230031, China; zyxustc@mail.ustc.edu.cn

³ Department of Materials Science and Engineering, University of Science and Technology of China, Hefei 230026, China

* Correspondence: 2007990030@qhu.edu.cn (L.G.); liubx408@nenu.edu.cn (B.L.); Fax: +86-9715310440 (B.L.)

† These authors contributed equally to this work.

Received: 23 March 2020; Accepted: 17 April 2020; Published: 20 April 2020

Table S1: The available techniques for detection of TATP.

| Detection Techniques | Sensing Materials | Limits of Detection | Response Time | Reference |
|----------------------------------|-----------------------------------------------------|-------------------------|---------------|-----------|
| Semiconductor based vapor sensor | organic-semiconductor sensors | <100 ppb | 30 s | [1] |
| | SnO ₂ and WO ₃ | 12 ppb | - | [2] |
| | metal oxide catalyst | 8 ppm | 2 min | [3] |
| | In ₂ O ₃ nanoparticles | 2.9 ppb | 120 s | [4] |
| Ion mobility spectrometry | - | 1.2 ng | - | [5] |
| Colorimetric method | colorimetric sensor | <2 ppb | - | [6] |
| | silver nanoparticles | 20 nM | - | [7] |
| | N,N-dimethyl-p-phenylene diamine | 0.1 mg·L ⁻¹ | - | [8] |
| Electrochemical method | Molecularly-imprinted polymer | 26.9 μg·L ⁻¹ | - | [9] |
| | Fe ^{II/III} ethylenediaminetetraacetate | 0.89 μM | - | [10] |

References

1. Capua, E.; Cao, R.; Sukenik, C.N.; Naaman, R. Detection of triacetone triperoxide (TATP) with an array of sensors based on non-specific interactions. *Sens. Actuators B Chem.* **2009**, *140*, 122–127.
2. Warmer, J.; Wagner, P.; Schöning, M.J.; Kaul, P. Detection of triacetone triperoxide using temperature cycled metal-oxide semiconductor gas sensors. *Phys. Status Solidi* **2015**, *212*, 1289–1298.
3. Amani, M.; Chu, Y.; Waterman, K.L.; Hurley, C.M.; Platek, M.J.; Gregory, O.J. Detection of triacetone triperoxide (TATP) using a thermodynamic based gas sensor. *Sens. Actuators B Chem.* **2012**, *162*, 7–13.

4. Zhang, W.-H.; Zhang, W.-D.; Chen, L.-Y. Highly sensitive detection of explosive triacetone triperoxide by an In₂O₃ sensor. *Nanotechnology* **2010**, *21*, 315502.
5. Wen, M.; Jiang, L.; Liu, W.; Cheng, S.; Wang, W.; Chen, C.; Liang, X.-X.; Zhou, Q.-H.; Peng, L.-Y.; Li, J.-H.; et al. Sensitive Detection of Triacetone Triperoxide (TATP) by Acetone-Assisted Photoionization Ion Mobility Spectrometry *J. Chin. Mass Spectrom. Soc.* **2014**, *356*, 481–487.
6. Lin, H.; Suslick, K.S. A Colorimetric Sensor Array for Detection of Triacetone Triperoxide Vapor. *J. Am. Chem. Soc.* **2010**, *132*, 15519–15521.
7. Üzer, A.; Durmazel, S.; Erçağ, E.; Apak, R. Determination of hydrogen peroxide and triacetone triperoxide (TATP) with a silver nanoparticles—based turn-on colorimetric sensor *Sens. Actuators B Chem.* **2017**, *247*, 98–107.
8. Can, Z.; Üzer, A.; Türkekul, K.; Erçağ, E.; Apak, R. Determination of Triacetone Triperoxide with a N,N-Dimethyl-p-phenylenediamine Sensor on Nafion Using Fe₃O₄ Magnetic Nanoparticles *Anal. Chem.* **2015**, *87*, 9589–9594.
9. Mamo, S.K.; Gonzalez-rodriguez, J. Development of a Molecularly Imprinted Polymer-Based Sensor for the Electrochemical Determination of Triacetone Triperoxide (TATP) *Sensors* **2014**, *14*, 23269–23282.
10. Laine, D.F.; Roske, C.W.; Cheng, I.F. Electrochemical detection of triacetone triperoxide employing the electrocatalytic reaction of iron(II/III)-ethylenediaminetetraacetate and hydrogen peroxide *Anal. Chim. Acta* **2008**, *608*, 56–60.



© 2020 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).