



The University of Edinburgh

Photocatalytic Water Purification in Rural India



Neil Robertson

University of Edinburgh

Aruna Ivaturi, Thalia Chatzisyneon, Gylen Odling

GCRF, Criticat

EPSRC

Engineering and Physical Sciences
Research Council





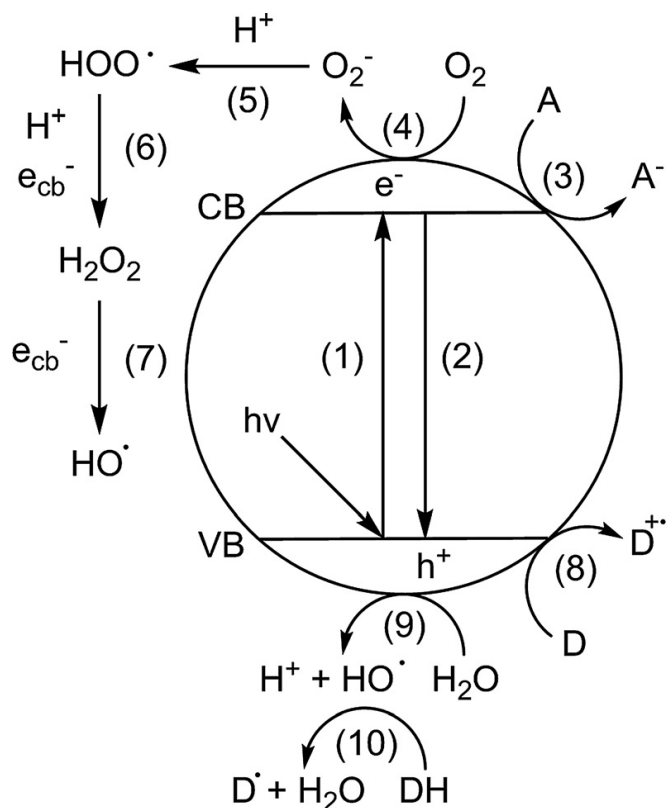
- World Health Organisation: “748 million people rely on unimproved water sources.” (77 million in India)
- India: water-stressed nation by 2020; Around 37.7 million Indians are affected by waterborne diseases annually, 1.5 million children are estimated to die of diarrhoea alone and 73 million working days are lost due to waterborne disease each year.
- The United Nations: “in 15 years time there will be a global fresh water shortfall of 40%.”

WHO Water Fact Sheet No. 391, **2014**.

Water Aid: Drinking water quality in rural India: Issues and approaches, **2008**

United Nations World Water Development Report **2015**

Semiconductor Photocatalysis

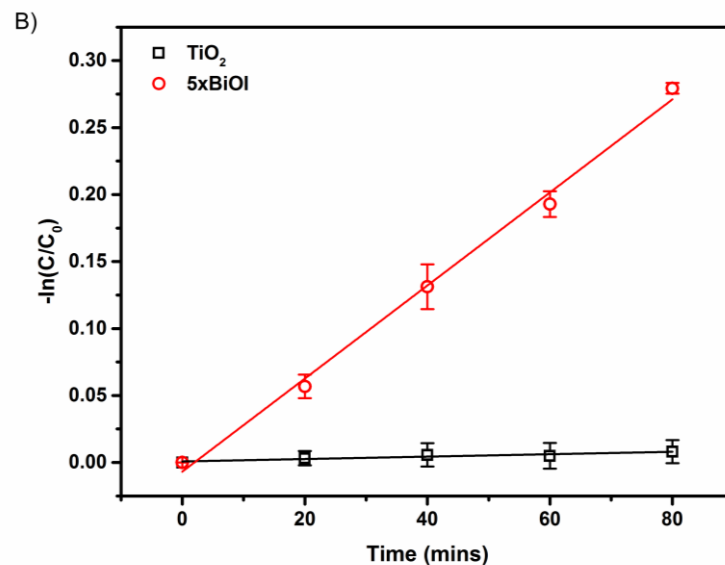
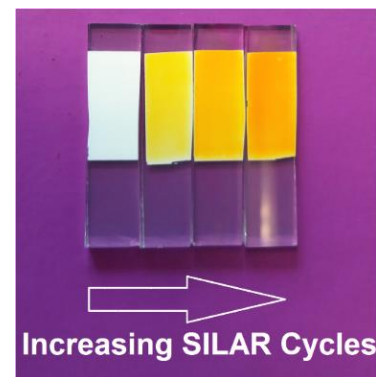
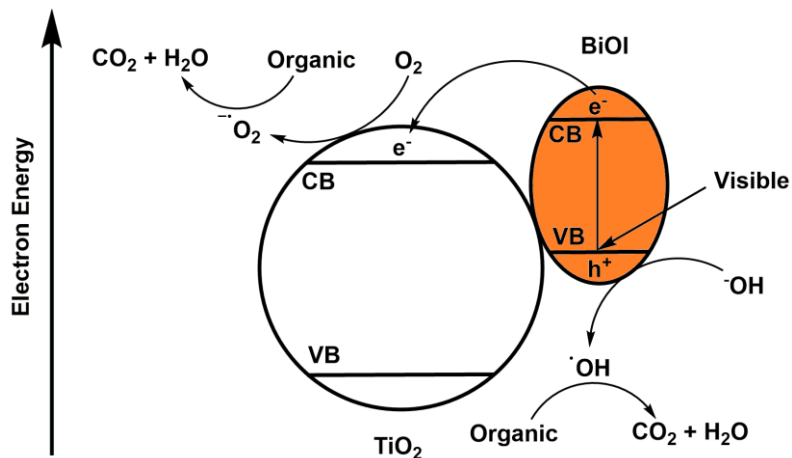


TiO₂

- Only absorbs UV
- Rapid charge recombination
- Powder needs separated

ChemSusChem, 2015, **8**, 1838
ChemPhysChem, 2016, **17**, 2872
ChemPhysChem, 2017, **18**, 728
ChemCatChem, 2017, in press

Heterojunction Photocatalysis



TiO₂-Carbon Materials

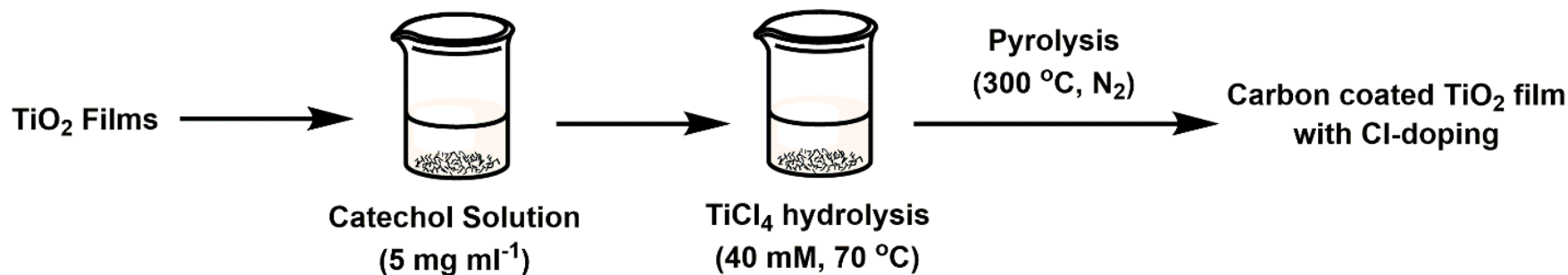


Figure 1. Preparation of the carbon coated and Cl-doped films.

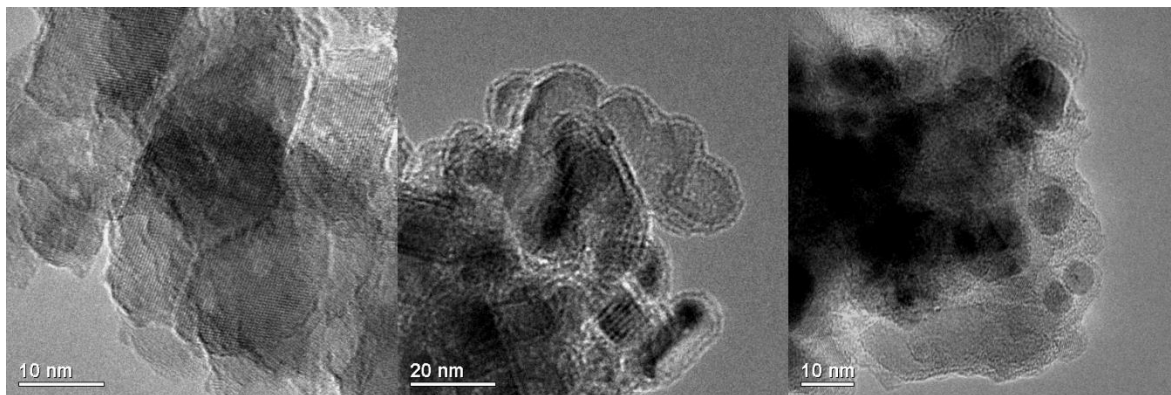


Figure 4. TEM images of TiO₂ (left), C-TiO₂ (mid) and C-TiCl₄-TiO₂ (right).

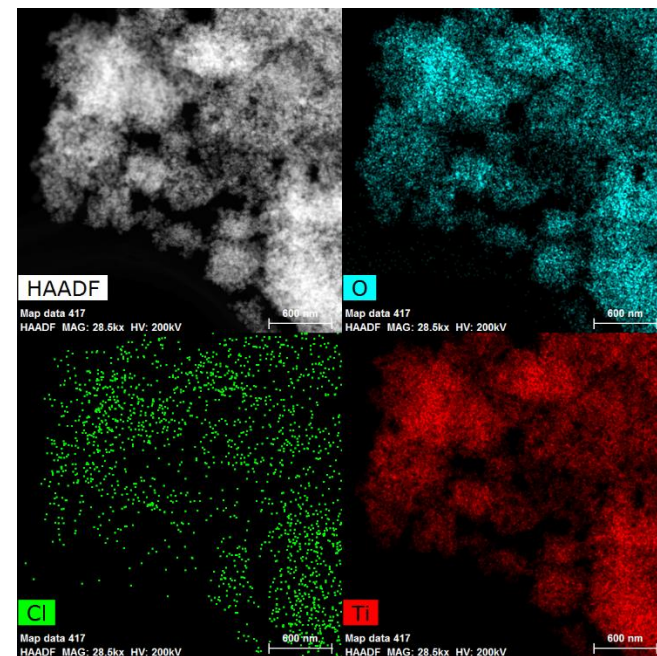
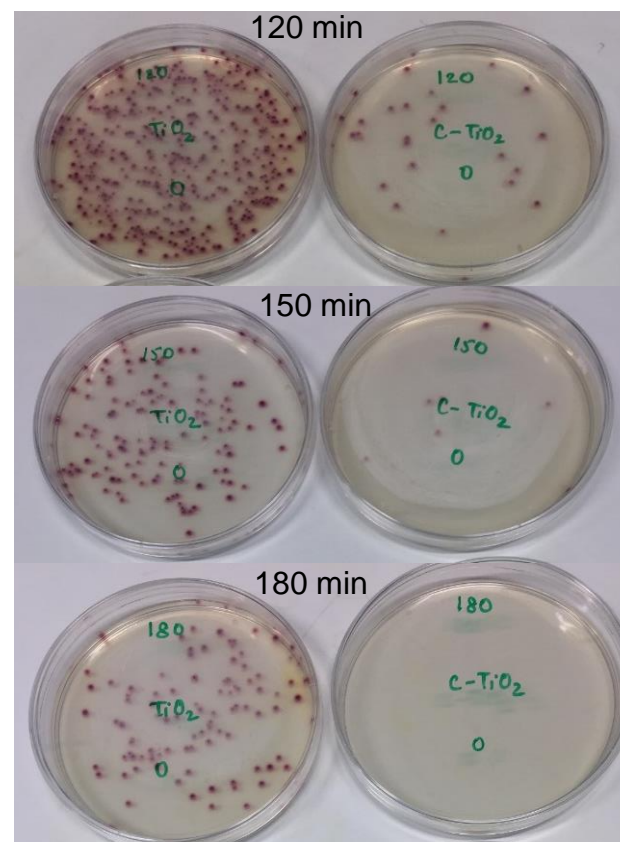
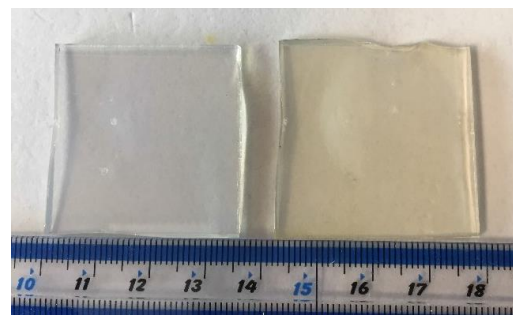
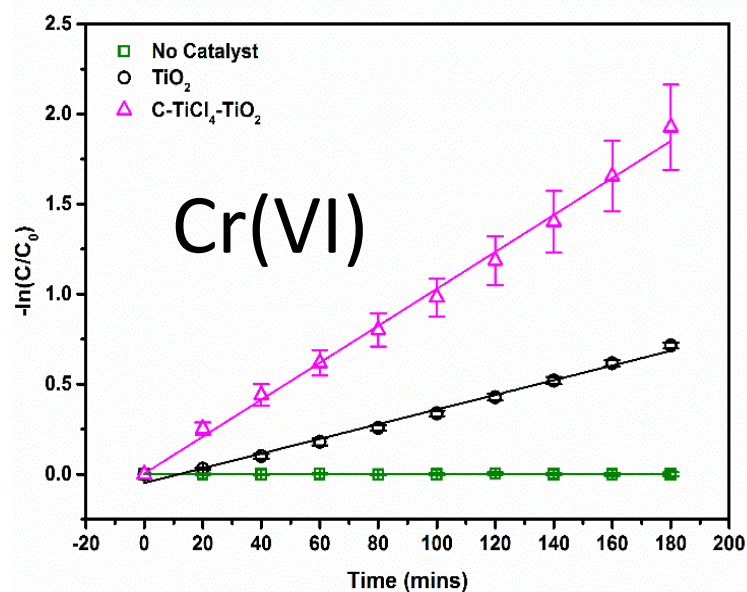
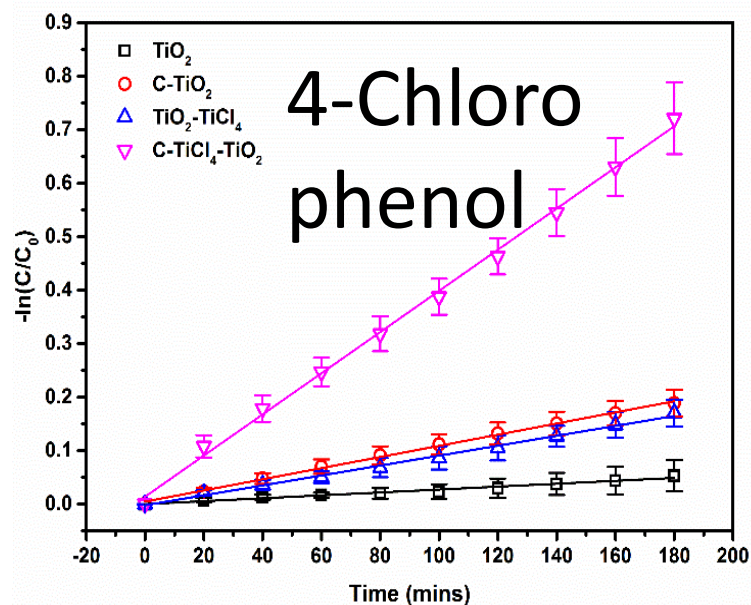
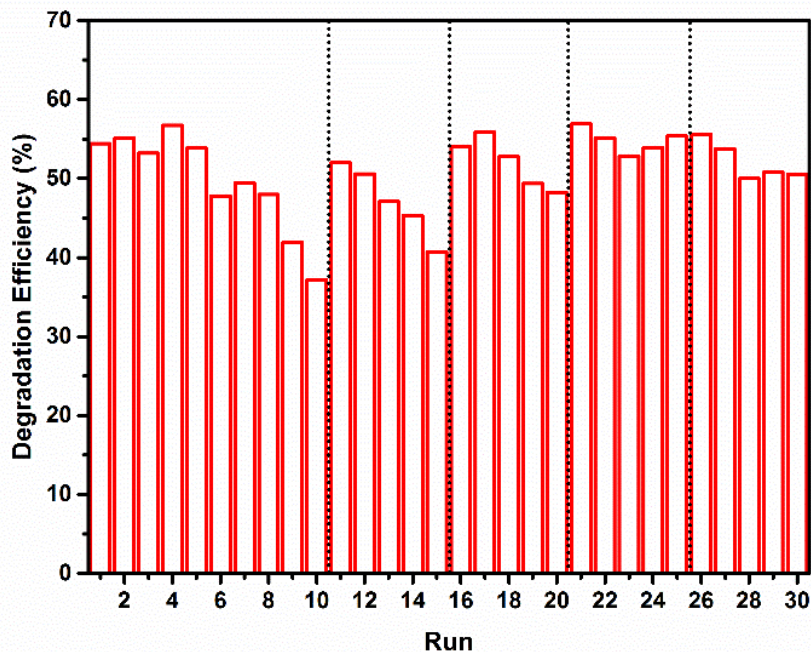


Figure 5. TEM-EDS maps of C-TiCl₄-TiO₂, showing the high angle annular dark field image (HAADF), oxygen (blue), chlorine (green) and titanium (red) maps of the area.

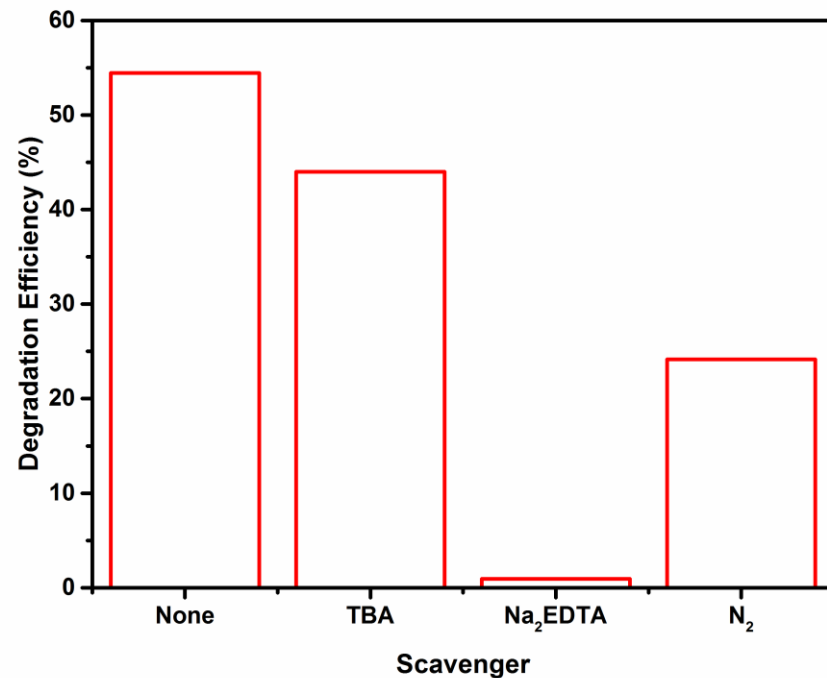
TiO₂-Carbon Materials



TiO₂-Carbon Materials



Excellent stability



Mainly holes are active



Partners

Indian Institute for Science Education and Research, Pune

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH (IISER) PUNE
where tomorrow's science begins today
An Autonomous Institution, Ministry of Human Resource Development, Govt. of India

English | हिंदी
Home | A-Z Index | Contact | Sitemap

About Us | People | Research | Education | Admissions | Facilities | Outreach | Contact | Partnerships

News
Tuning the universality class of quantum spin
Prolonging the Quantum nature
Yakhombha Mutum bags Gates Cambridge Scholarship
Mathematics Day 2017 Celebrated
more

In the Media
Links
Awards & Honours

Research
IISER Pune is a research-intensive teaching institute. Our faculty and students investigate questions in science that lie beyond the boundaries of conventional thinking. The whole ambience is very academic with high energy levels to pursue top quality research.
IISER Pune is also a member of Association of Indian Universities. Since its inception, IISER Pune has published over 900 research papers in highly reputed national and international journals. Several of these publications have come out of the 5th year research projects of BS-MS students.
See IISER Pune News
The Government of India, through the Ministry of Human Resource Development (MHRD), has established seven Indian Institutes of Science Education and Research (IISER). These institutes are located in Bhopal, Berhampur, Mohali, Pune, Kolkata, Thiruvananthapuram and Trirupat.
The IISERs represent a unique initiative in India where teaching and education are totally integrated with state-of-the-art research nurturing both curiosity and creativity in an intellectually vibrant atmosphere of research. Each IISER is an autonomous institution awarding its own Masters and Doctoral degrees.

Events
May 02 Pre workshop for State Teachers Science
May 11 Inter IISER Mathematics meet
Jun 19 Recent Trends in Non-Commutative Algebra
Jun 21 Student Workshops in Experimental Biology
Jun 24 Biennial Meeting of Indian Society of
Jul 10 Workshop and Conference on
more

Samuchit Envirotech

Samuchit Envirotech
Contact Us Search ...

Environment & Climate Change Sustainable Land Use Sustainable Living Responsive Governance About Us

1/18 Samuchit ELFD Sampada 9 inch dia Demo

April 2017 offers
FESTIVE APRIL OFFER
BUY WORTH INR 200 GET ORGANIC GIFT

Upcoming Events
महिला उद्योजक प्रदर्शन
Venue अखिल ब्राह्मण संस्था - महिला उद्योजक प्रदर्शन, गुड्डे मंगल कार्यालय, केसरी वाड्या समोर, नारायण पेठ, पुणे.
Schedule १७, १८, १९ मार्च २०१७ : स. ९ ते सों. ८ वाजे पर्यंत
Contact Samuchit Envirotech on 020 25460138

Latest Blog
• MUSINGS FROM PRIYADARSHINI KARVE: स्वयंपाकासाठी स्वच्छ ऊर्जा
• SUSTAINABLY SMART PUNE STUDY: Socio-economic equity indices
• SUSTAINABLY SMART PUNE STUDY - Survey Analysis VII
• SUSTAINABLY SMART PUNE STUDY - Survey Analysis VI
• SUSTAINABLY SMART PUNE STUDY - Survey Analysis V
• SUSTAINABLY SMART PUNE STUDY - Survey Analysis IV



The University of Edinburgh



Khechare





The University of Edinburgh





Future Focus

- **Rural India – Drinking water**
 - Domestic level
 - Catalyst on beads, mesh, fabric, plastic
 - Add to clear bottle, stand in the sun
- **Rural India – Waste water**
 - Much more challenging
 - Pretreat with adsorbant (biochar)
 - Village level system
- **Other photocatalytic water purification contexts**