Particle & Particle Systems Characterization
www.particle-journal.com

Recent Advances in the Applications of Nanotechnology and Nanomaterials in the Petroleum Industry: A Descriptive Review

Areeba Khayal, Virendra Kumar Yadav, Shivraj Gangadhar Wanale,* Krishna Kumar Yadav, Abhishek Meena, Mohd Shkir, Zubair Ahmad, and Byong-Hun Jeon**

Nanotechnology applications are rapidly expanding in various fields because of its unique qualities, such as a large surface area. Also, the synthetic changes can be utilized to alter nanomaterial to fit into specialized necessities. From the last decade there is a tremendous increase in the utilization of nanotechnology and nanomaterials in the petroleum industry. The current review's main objective is to summarize numerous nanoparticle applications in the field of petroleum, bio-fuel formation, and clean-up treatments of oil spill-related issues with their existing challenges that may help improve further research.

1. Introduction

Recently, nanoscience/nanotechnology-related research has gained vast attention from many researchers. Worldwide, several governments have invested a tremendous amount of money in developing research and development activities in the nanotechnology field. The National Nanotechnology Initiative received $27 billion in the 2019 budget.[1] The concept of nanoscience was developed by Richard Feynman talk in 1959. After that, Professor Norio introduced the term "nanotechnology" in 1974. The prefix "nano" means dwarf or finesse around one thousand millionths of a meter

A. Khayal
Department of Industrial Chemistry
Aligarh Muslim University
Aligarh, Uttar Pradesh 202002, India

V. K. Yadav
Department of Life Sciences
Hemchandracharya North Gujarat University
Patan, Gujarat 384265, India
E-mail: virendra.yadav@jnujaipur.ac.in

S. G. Wanale
School of Chemical Sciences
Swami Ramanand Teerth Marathwada University
Nanded, Maharashtra 431606, India
E-mail: shivrajwanale@srtmun.ac.in

K. K. Yadav
Faculty of Science and Technology
Madhyanchal Professional University
Ratibad, Bhopal 462044, India

K. K. Yadav
Environmental and Atmospheric Sciences Research Group
Scientific Research Center
Al-Ayen University
Thi-Qar, Nasiriyah 64001, Iraq

A. Meena
Department of Physics and Semiconductor Science
Dongguk University
Seoul 04620, Republic of Korea

M. Shkir
Research Center for Advanced Materials Science (RCAMS)
King Khalid University
P.O. Box 9004, Abha 61413, Saudi Arabia

M. Shkir
Department of Physics
Faculty of Science
King Khalid University
Abha 61413, Saudi Arabia

M. Shkir
Division of Research and Development
Lovely Professional University
Phagwara, Punjab 144411, India

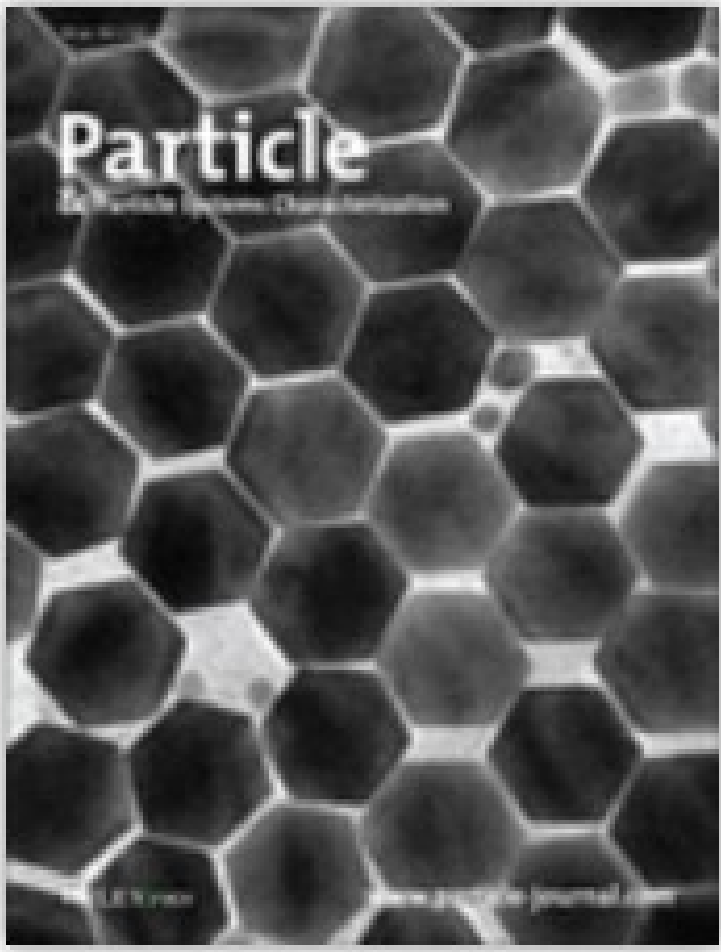
Z. Ahmad
Research Center for Advanced Materials Science (RCAMS)
King Khalid University
P.O. Box 9004, Abha 61413, Saudi Arabia

Z. Ahmad
Applied College
Mahala Campus
King Khalid University
P.O. Box 9004, Abha 61413, Saudi Arabia

B.-H. Jeon
Department of Earth Resources and Environmental Engineering
Hanyang University
222 Wangsimni-ro, Seongdong-gu, Seoul 04763, Republic of Korea
E-mail: bhjeon@hanyang.ac.kr

The ORCID identification number(s) for the author(s) of this article can be found under https://doi.org/10.1002/ppsc.202300029

DOI: 10.1002/ppsc.202300029


Particle