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(71)**Name of Applicant :**
1)Prof. Madhuri Shashikant Pawar
Address of Applicant :Prof. Madhuri Shashikant Pawar ,Assistant Professor, Department of science and Humanities , MET'S Bhujbal Knowledge City,Institute Of Technology(P)-B.Tech,Adgaon,Nashik- 422003 madhuripawar.dtcnashik@gmail.com Phone: 9423226555 ---------- ----------
2)Dr.Arun Sukdeo Garde
3)Dr.Tushar Arun Garde
4)Prof. Nilakshi Sampat Mahale
5)Dr.Rajendra Shaligram Dhake
Name of Applicant : NA
Address of Applicant : NA
(72)**Name of Inventor :**
1)Prof. Madhuri Shashikant Pawar
Address of Applicant :Prof. Madhuri Shashikant Pawar ,Assistant Professor, Department of science and Humanities , MET'S Bhujbal Knowledge City,Institute Of Technology(P)-B.Tech,Adgaon,Nashik- 422003 madhuripawar.dtcnashik@gmail.com Phone: 9423226555 ---------- ----------
2)Dr.Arun Sukdeo Garde
Address of Applicant :Dr.Arun Sukdeo Garde ,Associate Professor and HOD,MGV'S S.P.H. Arts,Science& Commerce College,Nampur Tal.Baglan(Nashik)-423204 arungarde71@gmail.com ---------- ----------
3)Dr.Tushar Arun Garde
Address of Applicant :Dr.Tushar Arun Garde ,Research Scholar,Department of Orthodontics,D.Y.Patil University school of Dentistry,Navi Mumbai-400706 tushargarde7419@gmail.com ---------- ----------
4)Prof. Nilakshi Sampat Mahale
Address of Applicant :Prof. Nilakshi Sampat Mahale ,Professor, MET'S Bhujbal Academy of Science and Commerce,Nashik-422003 nilakshinil@gmail.com ---------- ----------
5)Dr.Rajendra Shaligram Dhake
Address of Applicant :Dr.Rajendra Shaligram Dhake ,Assistant Professor, MET'S Institute Of Engineering,Adgaon,Nashik- 422003 rajdhake@gmail.com ---------- ----------

(57) Abstract :
The present invention relates to a method and system for a nano-based water purification system specifically designed for rural India. The system employs nanotechnology, utilizing a composite filter comprising carbon nanotubes (CNTs) and silver nanoparticles (AgNPs) integrated with a low-cost, gravity-fed filtration unit to remove contaminants such as heavy metals, organic pollutants, and microbial pathogens from water sources commonly found in rural settings. The method involves a multi-stage purification process including pre-filtration, nano-filtration, and post-treatment disinfection, ensuring potable water that meets WHO drinking water standards. The system is designed to be cost-effective, portable, and operable without electricity, making it suitable for off-grid rural communities. The filtration unit is modular, allowing easy replacement of nano-materials, and incorporates a self-cleaning mechanism to enhance durability and reduce maintenance. The invention addresses the critical need for accessible, clean drinking water in rural India, where waterborne diseases are prevalent due to contaminated groundwater and surface water sources. The system's scalability and affordability make it a viable solution for widespread adoption, contributing to improved public health and sustainable water management.

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