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pH-Triggered controllable drug release from IBN-4 nanoparticles via disintegration of Hydrazide bonds for oral delivery of Antimicrobials

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An efficient approach for the oral delivery of antimicrobial agents specifically at gastric pH was proposed. First, the starting IBN-4 Nanoparticles are examined to verify that their synthesis has been successful considering the structural properties, using transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR), nitrogen adsorption/desorption and Brunauer-Emmett-Teller (BET). The nanoparticles were functionalized with transition metal copper which functioned as model drug. Copper was immobilized by a two-step process where in IBN-4 nanoparticles are initially functionalized with Triethoxysilyl butyl aldehyde silane (TESBAS) groups to exploit host guest chemistry. The TESBAS attached to nanoparticles was complexed with Indole-3 acetic acid hydrazide through a coordination bond which was further conjugated with metal ions. When the transitional metals complex with IBN4-TESBAS-IAAH-METAL's chemistry will be exposed to pH ≥ 5 (*in vitro* in simulated gastric and intestinal fluids), the metal ions were efficiently released (100%) in a controlled manner up to 24 hours by pH sensitive denial of hydrazide bonds. In contrary a very low drug release (about 5%) is seen at basic pH (7.4) demonstrating the pH sensitive release of drugs. The antibacterial activity tests against Escherichia coli (E. coli) showed an inhibition up to 95% with significant DNA damage and, more importantly, these particles were shown to maintain a high level of activity for longer periods of time. Fluorescein isothiocyanate (FITC) loaded into these IBN-4 particles was used as a model platform to assess its efficacy as a drug delivery tool and the particle uptake mechanisms were studied. These findings suggest that IBN-4 particles hold tremendous promise in the areas of pH-sensitive drug delivery demonstrating their potential applicability in medicine.

Biography

Yaswanth Kuthati is a doctoral fellow at National Dong Hwa University, Taiwan. He received his bachelor's degree in Biotechnology from Sri Krishnadevaraya University, Anantapur in 2008. He earned his master's degree in Biotechnology from SRM University, Chennai in 2010. He is now in Taiwan in the pursuit of his Ph.D. under the supervision of Assistant Prof. Dr. Chia Hung Lee at National Dong Hwa University. His main research activities are focused on the development of multifunctional nanoparticles for biomedical applications.

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Integration of environment and nanomaterials: A case study

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This study explored the discourses of environmental narratives as an organized, viable, and dynamic social force basic to the creation and dissemination of environmental messages in Borana Oromo of the southern Ethiopia. Under this major objective, the study focused on the integration of nanomaterials into biosensing systems represents one of the hottest topics of the today nanotechnology and nanoscience.

Biography

Teshome Tafesse is a lecturer at Addis Ababa University, where he obtained his MA in Journalism and Communication in 2006. He also received a professional certificate in International Cooperation from Wroclaw University, Poland in 2009. He has published a book entitled "*News Coverage of Regions in Ethiopia: The Case of ETV Amharic Broadcast*" He has also co-written high school Oromo Language texts books. He is currently doing his Ph.D. in Applied Linguistics and Communication at Addis Ababa University, Ethiopia.

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