



Final Year Project Showcase Batch 2022 Year 2022

Department: Chemistry Programme: Industrial Chemistry		
1	Project Idea	Facile Synthesis of silver nano-hybrid stabilized by novel pyrimidine derivatives for textile, biological and environmental applications.
2	Process	Chemical reduction , Co precipitation and Solgel methods
3	Outcome	Successfully synthesized stable AgNps doped TiO ₂ Nps and ZnONps by using short chain 5-(3-Nitrophenyl)-3-(pyrimidine-2-yl)-4,5-dihydro-1-H-pyrazole-1-carbothioamide (PDPC). Our prepared PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps are multipurpose and successfully exhibited superior UV blocker , environmental and biological activities.
4	Evidence (Theoretical Basis)	<p>The present study provides a comprehensive study regarding the synthesis of stable AgNps doped TiO₂ Nps and ZnONps by using short chain 5-(3-Nitrophenyl)-3-(pyrimidine-2-yl)-4,5-dihydro-1-H-pyrazole-1-carbothioamide (PDPC). PDPC rigidly stabilized AgNps doped TiO₂ Nps and ZnONps under an ambient temperature and pressure conditions. AFM vividly showed mono disperse and spherical shape PDPC stabilized AgNps doped TiO₂Nps and ZnONps with a mean average diameter of 4±1 and 10±1nm respectively. Our prepared PDPC stabilized AgNps doped TiO₂Nps and ZnONps are multipurpose and successfully exhibited superior UV blocker , environmental and biological activities.</p> <p>The performance of PDPC stabilized AgNps doped TiO₂Nps and ZnONps as UV-absorbers can be efficiently transferred to cotton blended materials through the application of as prepared nanoparticles on the surface of cotton blended fabrics. The UV-visible tests indicated a significant improvement of the UV absorbing activity of the PDPC stabilized AgNps doped TiO₂Nps and ZnONps -treated fabrics. Such results can be exploited for the protection of the body against harmful solar radiation and for other technological applications.</p> <p>PDPC stabilized AgNps doped TiO₂Nps and ZnONps systems also showed superior biological activity including antioxidant and urease inhibition. Moreover , PDPC stabilized AgNps doped TiO₂Nps and ZnONps system exhibited excellent catalytic activity as heterogeneous catalyst in the reduction of EPA declared number one pollutant 4 nitrophenol (4-NP) to reduce into nontoxic aromatic compound 4 aminophenol (4-AP) as well as reduction of pollutant Methylene blue to leucomethylene blue within one second. The facile method used for the formation of PDPC stabilized AgNps doped TiO₂Nps and ZnONps system has several benefits such as biocompatibility, reproducibility, cost, and time effective which make them excellent candidate in commercial and environmental applications.</p>
5	Impact on Sustainability of Urban Regions or SDG-11	SDG attainment level is "Target 11.6" Reduce the Environmental Impact of Cities. Our prepared PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps are multipurpose and successfully exhibited superior UV blocker , environmental and biological activities. The chemical



	“Sustainable Cities and Communities”	reduction, Co-precipitation and Solgel methods are used for the synthesis of PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps. The narrow size of these nanoparticles are multipurpose and successfully applied in textile, environmental and biological fields to safe guard humanity from harmful UV radiations in the region. Moreover PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps system as heterogeneous catalyst also greatly reduced the environmental pollution within no time. It includes reduction of pollutant 4-NP to 4-AP and MB to LB within one second thus greatly reduced the environmental pollution. Furthermore to safe human health in the region we successfully tested our prepared PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps in biological activities as urease inhibitor and antioxidant. Their even very low concentration worked very well as antioxidant and urease inhibitor.
6	Competitive Advantage or Unique Selling Proposition (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over a competitor. In summary, any striking aspect of the project that compels the industry to invest in FYP or purchase it. Some detailed description is required in terms of how, why when what. You can select one or more from the following dropdown and delete the rest of them). Please keep relevant options, delete the rest of them, and correct the sequence	
a	Attainment of any SDG (e.g. How it is achieved and why it is necessary for the region)	SDG#11: Sustainable Cities and Communities to achieve the target 11.6 as mentioned above in Sr#5”.
b	Environmental Aspect (e.g. carbon reduction, energy-efficient, etc.)	Our prepared PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps are environmental friendly and successfully applied as an excellent UV blocker on cotton blended fabrics and completely blocked harmful carcogenic UV radiations. PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps also showed superior biological antioxidant activity through its DPPH radical scavenging activity and urease inhibition activities as compare to control and standard. A large number of ureolytic bacteria are responsible for different infectious diseases in human being, such as Helicobacter pylori (H. pylori) present in the duodenum and stomach of human beings. The bacteria release Urease enzyme in stomach, which produce ammonia from urea, thus, reduce the pH of stomach and make the environment favorable for their survival, hence causes various gastric problems. According to some literature, infection caused by H. Pylori was assumed to link with cardiac problems and other. In addition to this, Antioxidants represent a form of opposition to oxidants. Antioxidant as any substance that delays, prevents, or removes oxidative damage to a target molecule. Antioxidants are natural or synthetic substances that may prevent or delay damage of cell caused by oxidants (ROS, RNS, free radicals, other unstable molecules). Antioxidant as any substance that delays, prevents, or removes oxidative damage to a target molecule. Our obtained PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps demonstrated excellent antioxidant and urease inhibition activities as compared to control and standard.
f	Capture New Market (e.g. Niche market or unaddressed segment)	Our prepared PDPC stabilized AgNps doped TiO ₂ Nps and ZnONps can easily capture new markets include paints, pesticides, skin care products etc.
7	Target Market	Industries, groups, families and student etc.

<p>8</p>	<p>Team Members (Names along with email address)</p>	<p>Saman Fatima , Huzifa Mushkooor, Hassan Munir, Wajeeha Qureshi. samanfatima872000@gmail.com huzifa4105852@cloud.neduet.edu.pk shaikh Hassanmunir97@gmail.com wajeeha.queshi01@gmail.com</p>
<p>9</p>	<p>Supervisor Name (along with email address)</p>	<p>Dr. Rafia Usman Khan and Dr.Nuzhat Arshad Email: rkhan@neduet.edu.pk</p>
<p>10</p>	<p>Pictures</p>	<p>The image illustrates the synthesis and applications of Ag NPs and Ag NPs doped ZnO NPs and TiO₂ NPs. The synthesis process involves the use of a novel pyrimidine derivative stabilizer. The synthesis of Ag NPs is shown via co-precipitation and doping. The synthesis of Ag NPs doped ZnO NPs is shown via co-precipitation and doping. The synthesis of Ag NPs doped TiO₂ NPs is shown via sol-gel and doping. The structure of the novel pyrimidine derivative stabilizer is given as C₁₅H₁₃N₄O₂S. The applications are categorized into Textile (UV protection), Biological (Antioxidant, Anticancer, Urease Inhibition, Antimicrobial), and Environmental (PeP Reduction, Methylene Blue Reduction).</p>