Novel Virus-like Mesoporous Silica-ZnO-Ag Nanoparticles and Quercetin Synergize with NIR Laser for Covid-19 Infectious Diseases Treatment

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Abstract (300-word limit)

This work shows that novel virus-like mesopore silica-zinc oxide/Ag nanoparticles (SZnOAg) synthesized and professionally collected on NIR laser irradiation with quercetin to improve their effectively eliminates the virus as a biomedical application. The properties of the nanoparticles can be tuned with respect to their core diameter, tubular length, and outer diameter. Due to their biomimetic appearance, they can rapidly transform living cells into virus-like particles, this SZnOAg nanomaterials has specific elimination effect on bacteriophage and covid-19. Using epitaxial growth, we can construct virus-like structures that can be used for biomedicine applications. These nanomaterials and NIR laser could open the way to a new range of antiviral materials, due to the low-efficiency cellular uptake of current nanoparticles, their applications in the biomedical field are limited. Herein, it clearly shown that novel mesoporous silica nanoparticles can be easily exhibited superior cellular uptake property.

Recent Publications

1-Fadi Ibrahim, 2020, "Novel Inhibitor for Covid-19 From Zinc Nano-Based Aza-Pc and CODs "International Journal of Modern Pharmaceutical Research, 4(3), 91-96, ISSN: 2319-5878.

2- Fadi Ibrahim, 2019, "Environmental Protection from Greenhouse CO2 Pollutant Gas Using Spiro-Microporous Absorbent Network", World Conference on Teacher Education (WCTE-19), International Institute of Education, Research and Development (IIERD), Kuwait.

3- Fadi Ibrahim, 2018,"Green Synthesis of Zinc-Nanoparticles Using Capillary-Furnace LED Based Reactor from Portulaca oleracea Leaf and its Applications in Antimicrobial Activity" 5th Kuwait Conference of Chemistry – KCC-5. www.kcc2018kw.com.

4-Fadi Ibrahim, 2017, "Novel Green-Chemistry Micro-Fluidic Synthesis of Anthracene-Based Microporous for H2 Storage by Capillary-Furnace LED Based Reactor" Journal of Nanoscience & Nanotechnology Research, iMedPub Journals. Vol.1 No.1:1.

5- Fadi Ibrahim, 2016, "Novel Synthesis of Calametic Liquid Crystals Derivatives by Flow Injection System as Environment Friendly Method" 4th Kuwait Conference of Chemistry KCC, 2016.

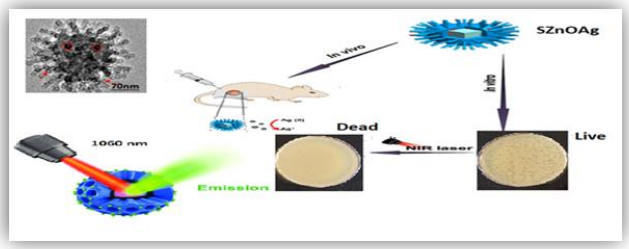


Figure 1: Schematic description photothermal effect of the quercetin and SZnOAg under NIR laser irradiation (1060 nm) and its synergistic antiviral effects.

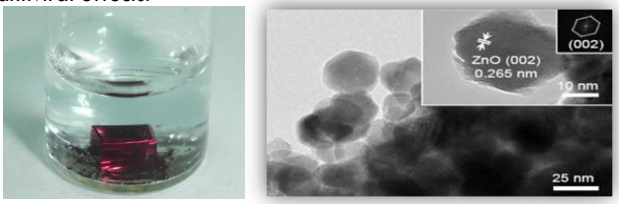


Figure 2: FE-TEM images with crystallinity and electron diffraction.

References: (1) Abian O, Ortega-Alarcon D, Jimenez-Alesanco A, Ceballos-Laita L, Vega S, Hugh T, et al. Structural stability of SARS-CoV-2 3CLpro and identification of quercetin as an inhibitor by experimental screening. Int J Biol Macromol. (2020) 164:1693–703.

(2) Wenxing Wang, Peiyuan Wang, Xueting Tang, Ahmed A. Elzatahry, Shuwen Wang, Daifallah Al-Dahyan, Mengyao Zhao, Chi Yao, Facile Synthesis of Uniform Virus-like Mesoporous Silica Nanoparticles for Enhanced Cellular Internalization. ACS Cent. Sci. (2017) 3: 839−846.



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Academic Qualifications

High School: El-Rabia School, Kuwait, 1994, (94.1%).

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MSc : Master's in chemistry, 2007, (GPA 4) (practical works within 9 month). Kuwait University, (Kuwait).

Ph.D. : Doctorate Degree in Chemistry, 2012, (GPA 3.93) Kuwait University, (Kuwait).

Post D : Related to novel polymer based hydrogen storage materials, 2013, Kuwait University, (Kuwait).

- The winner Poster of the first Kuwait France chemistry meeting 2009.
- The winner of Master graduate research award in applied sciences for postgraduate research project from Kuwait University 2007/2008.
- The winner of PhD graduate research award in applied sciences for postgraduate research project from Kuwait University 2013/2014.
- Participated in the “International Conference on Chemistry and Chemical Engineering” (ICCCE-2015) September 14-16, 2015, Dubai- United Arab Emirates.
- Participated in the 2nd Kuwait Oil & Gas Show and Conference 2015.
- The winner of Kuwait National Petroleum Company KNPC-8th CEO Annual HSE improvement performance, 2015.
- The winner of best paper award certificate from TJPRC “International Journal of Nanotechnology and Application”, 2015, with paper titled “Synthesis of Smectic and Discotic Liquid Crystals Derivatives by Flow Injection System”.
- The winner of Energy Globe National Award 2016 "Polymer for Climate Protection".
-Participated in 27th International Conference on Organometallic Chemistry ICOMC, "High surface area anthracene-based microporous polymer bridged by imide links for H_2 storage", 17-22 July 2016, Melbourne, Australia.
-Participated in ISERD- 199th International Conference on Chemical and Biochemical Engineering (ICCBE) Kuwait City, Kuwait. Paper Title: Smart Synthesis of Microporous Polymers by Flow Injection method For CO_2 capture. 29th-30th June 2017.
-Participated in7th World Congress on Biopolymers and Polymers Chemistry, June 04-06, 2018, Osaka, Japan.
- The winner of Excellence in Reviewing Certificate from the Annual Research & Review in Biology 2020.
- The winner of the best researcher award of international scientist awards 2021 on engineering science and medicine.