SCHOLARLY PUBLICATIONS
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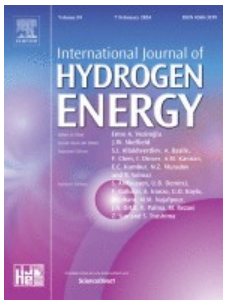
Journal Name: International Journal of Hydrogen Energy **IF: 8.1**

Title: Investigations on the performance, emission and combustion characteristics of a dual-fuel diesel engine fueled with induced bamboo leaf gaseous fuel and injected mixed biodiesel-diesel blends

Author: Nguyen V.N., Nayak B., Singh T.J., Nayak S.K., Cao D.N., Le H.C., Nguyen X.P.

Details: Volume 54, February 2024

Abstract: The present paper briefly elaborates upon the combination of waste palm and waste sunflower oil methyl ester as post-mixed biodiesel blends being injected into a four-stroke compression ignition engine, which is also fueled with inducted bamboo leaf generated producer gas (BLP.gas) that includes gaseous components of CO (carbon monoxide), H2 (hydrogen), CH4 (methane), and CxHy (hydrocarbons). The objective of the present research is to evaluate the overall performance, emission, and combustion behavior of a Kirloskar TAF1 modified dual-fuel diesel engine fueled with induced bamboo leaf-derived gaseous fuel at a fixed mass flow rate of 21.69 kg/h and injected mixed biodiesel-diesel blends. Initially, diesel fuel and post-mixed methyl ester were examined in dual-fuel mode with a fixed gas flow rate for different loads. It can be seen from the analysis that brake thermal efficiency got reduced by 4.66% and brake-specific fuel consumption increased by 5.26% for PMOME20 (20% post-mixed oil methyl ester + 80% diesel fuel) + BLP. gas with respect to diesel fuel at extreme loading conditions. Moreover, smoke opacity, carbon monoxide, and unburnt hydrocarbons were reduced by 11.22%, 20.44%, and 10.36%, respectively. On the other hand, oxides of nitrogen were reduced by 19.17% at maximum load for PMOME20 + BLP. gas in dual-fuel operation in contrast to that of petroleum diesel. In light of this, the current research concluded that the use of biodiesel and BLP. gas for dual-operative engines may be regarded as an appropriate option for reducing pollutant environment and petroleum fuel scarcity.



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SCHOLARLY PUBLICATIONS
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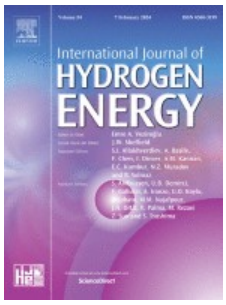
Journal Name: International Journal of Hydrogen Energy **IF: 8.1**

Title: Performance and emission characteristics of diesel engines running on gaseous fuels in dual-fuel mode

Author: Nguyen V.N., Nayak S.K., Le H.S., Kowalski J., Deepanraj B., Duong X.Q., Truong T.H., Tran V.D., Cao D.N., Nguyen P.Q.P.

Details: Volume 49, Part B January 2024

Abstract: Conventional fossil fuels are being substituted with alternative green fuels because of their greenhouse gas emissions and pollution problems, which pose a severe threat to the environment. Several studies have reported the usage of biodiesel and gaseous fuels in both single and dual-fuel modes. Gaseous fuels such as producer gas, biogas, syngas, and hydrogen produced from renewable biomass could potentially be used along with biodiesel in dual-fuel engines. Still, these are the least investigated in terms of their use as potential energy carriers. This review article encapsulates the viability as well as the impact of various gaseous fuels, including producer gas, biogas, compressed natural gas, liquefied petroleum gas, syngas, and hydrogen, in dual-fuel mode diesel engines with the aim of evaluating the performance, emission, and combustion behavior at various induction as well as operational parameters. Considering emission behaviors of diesel engines fueled with producer gas, biogas, compressed natural gas, and hydrogen, it is found that hydrocarbon and carbon monoxide emissions increase in the range 17.5–31.4% and 11.73–23.6%, respectively. On the contrary, oxide of nitrogen and smoke opacity tend to reduce from 14.3 to 18.2% and 21.4%36.5–63.7%, respectively. Moreover, there is a slight deterioration in performance characteristics for diesel engines fueled with producer gas, biogas, compressed natural gas, and hydrogen in the range of 2.1–8.84% for brake thermal efficiency, and 3.1–7.3% for brake-specific energy consumption. In addition, the combustion characteristics of gaseous fuels is also discussed in detail. Moreover, a SWOT analysis has been carried out with an emphasis on possibilities for usage of gaseous fuels in dual-fuel diesel engines. Finally, the limitations and perspectives of using gaseous fuels are also critically presented.



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SCHOLARLY PUBLICATIONS
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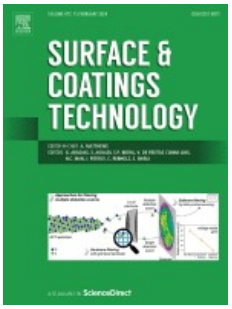
Journal Name: Surface and Coatings Technology **IF: 5.3**

Title: Elevated temperature tribological assessment of Ni-based cermet self-lubricating coatings deposited by cold spray

Author: Gautam R.K.S., Tripathi V.M., Gautam J.K., Singhania S., Singh S., Jha P., Shahab S., Mishra S., Nautiyal H.

Details: Volume 477, February 2024

Abstract: Solid lubricant coatings provide reduced friction and wear resistance and hence finding widespread application in harsh environmental conditions, such as gas turbine, aircraft, and internal combustion engines. It is apparent that single lubricant fails to offer effective lubrication over wide temperature range. Hence, two or more solid lubricants are mutually incorporated to achieve the appropriate lubrication by their synergy under harsh service conditions. The current investigation is being carried out to evaluate the synergistic impact of different solid lubricants viz. silver (Ag), molybdenum disulfide (MoS_2), hexagonal boron nitride (h-BN) and chromium oxide (Cr_2O_3) on the frictional properties of coatings from room temperature (RT) to 800 °C. Cold spraying process has gathered extensive acceptance for the development of metallic and metallic-ceramic coatings. The current study elucidated the tribological characteristics of cold sprayed nickel-based high temperature lubrication coatings, namely, Ni-Al-MoS_2-Ag (NB0), Ni-Al-MoS_2-Ag-5 wt% h-BN (NB5), Ni-Al-MoS_2-Ag-7.5 wt% h-BN (NB7.5), Ni-Al-MoS_2-Ag-10 wt% h-BN (NB10) and Ni-Al-MoS_2-Ag-Cr_2O_3–7.5 wt% h-BN (NB7.5 + 7 wt% Cr_2O_3) against Al_2O_3 ball in an operative testing regime from (RT-800 °C) using ball-on-disc tribometer. Results indicated that NB7.5+ 7 wt% Cr_2O_3 coating exhibited remarkable self-lubricating and wear resistance properties as compared to other coatings. However, NB7.5+ 7 wt% Cr_2O_3 revealed slightly higher coefficient of friction (COF) in compare to NB7.5 coating till 400 °C, and beyond that it showed a decreasing trend and lesser COF in compare to other coatings. The observed wear mechanisms at different temperatures were discussed in detail after analyzing the morphologies of worn surface. The pivotal role played by the participating solid lubricants were also discussed in detail which help in to provide the continuous compacted layers at the worn surfaces at elevated temperature.



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SCHOLARLY PUBLICATIONS
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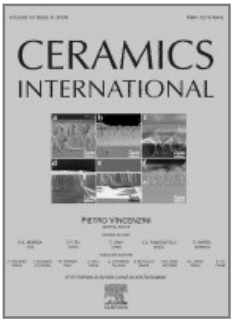
Journal Name: Ceramics International **IF: 5.1**

Title: Unveiling the multifaceted impact of C2H2 flow on SiCN CVD coatings: Mechanical mastery and beyond

Author: Kumar D., Das S., Swain B.P., Guha S.

Details: Volume 50, Issue 4, Pages 6526 – 6542, February 2024

Abstract: This comprehensive study systematically investigates the influence of C_2H_2 flow rates on silicon carbonitride (SiCN) thin films deposited on p-type c-Si (100) substrates through Chemical Vapor Deposition (CVD). Across a range of C_2H_2 flow rates (1–15 sccm), the study quantitatively analyzes surface morphology, crystallinity and mechanical characteristics. Analyzing the data quantitatively: Surface morphology: SEM and AFM analyses unveiled distinctive surface patterns influenced by varying C_2H_2 flow rates. Surface roughness exhibited a quantitative increase, rising from 1.2 nm at 1 sccm to 2.4 nm at 15 sccm. Ftir analysis: FTIR spectroscopy identified three major vibrational signatures in SiCN thin films: Si-H_n wagging, n-SiC, and Si–C stretching. Notably, the intensity of the n-SiC peak demonstrated a quantitative rise with increasing C_2H_2 flow rate. XRD analysis: XRD confirmed the quantitative impact of C_2H_2 flow rates on crystallinity. The SiCN thin film deposited at 15 sccm exhibited the highest crystallinity, with a quantified crystallite size of 15 nm. Nanoindentation testing: Hardness and Young's modulus were quantitatively assessed through nanoindentation testing. SiCN thin films showed a quantitative increase in both hardness and Young's modulus with rising C_2H_2 flow rates. The film deposited at 15 sccm demonstrated the highest hardness (i.e. 19.23 GPa) and Young's modulus (i.e. 271.56 GPa). In summary, this study establishes the significant impact of C_2H_2 flow rates on the quantitative aspects of surface morphology, crystallinity, and mechanical properties of SiCN thin films. Notably, the film deposited at 15 sccm emerges as distinctive, exhibiting the highest quantitative values for crystallinity, hardness and Young's modulus. This comprehensive analysis enhances the understanding of intricate relationship between C_2H_2 flow rates and the multifaceted properties of SiCN thin films.



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Journal Name: Toxicology **IF: 4.8**

Title: A review on toxicity mechanism and risk factors of nanoparticles in respiratory tract

Author: Khadanga V., Mishra P.C.

Details: Volume 504, May 2024

Abstract: This comprehensive review focuses on various dimensions of nanoparticle toxicity, emphasizing toxicological characteristics, assessment techniques, and examinations of relevant studies on the effects on biological systems. The primary objective is to comprehend the potential risks associated with nanoparticles and to provide efficient strategies for mitigating them by consolidating current research discoveries. For in-depth insights, the discussions extend to crucial aspects such as toxicity associated with different nanoparticles, human exposure, and nanoparticle deposition in the human respiratory tract. The analysis utilizes the multiple-path particle dosimetry (MPPD) modeling for computational simulation. The SiO_2 nanoparticles with a volume concentration of 1% and a particle size of 50 nm are used to depict the MPPD modeling of the Left upper (LU), left lower (LL), right upper (RU), right middle (RM), and right lower (RL) lobes in the respiratory tract. The analysis revealed a substantial 67.5% decrease in the deposition fraction as the particle size increased from 10 nm to 100 nm. Graphical representation emphasizes the significant impact of exposure path selection on nanoparticle deposition, with distinct deposition values observed for nasal, oral, oronasal–mouth breather, oronasal – normal augmenter, and endotracheal paths (0.00291 μg, 0.00332 μg, 0.00297 μg, 0.00291 μg, and 0.00383 μg, respectively). Consistent with the focus of the review, the article also addresses crucial mitigation strategies for managing nanoparticle toxicity.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0300483X24000623?via%3Dihub

SCHOLARLY PUBLICATIONS
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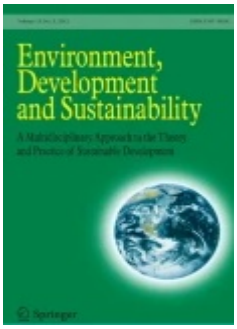
Journal Name: Environment, Development and Sustainability **IF: 4.7**

Title: Modified reaper for small-scale farmers: an approach for sustainable agriculture

Author: Mishra D., Satapathy S.

Details: Volume 26, Issue 1, Pages 1451 – 1480, January 2024

Abstract: Existing reapers for farming purposes are out of reach for small-scale farmers due to their high cost, and they are also unavailable in most rural locations due to transportation or financial constraints. There has recently been a demand for a compact, cost-efficient, more accessible, and effective crop reaper that can be operated by small-scale farmers. As a result, a cost-effective, farmer-friendly, and efficient crop reaper was developed in the present work, and its cutting efficiency was found to be improved as compared to the existing self-propelled reaper. Moreover, earlier works were either based on development of farm-based machinery and their performance or ergonomic aspects' evaluation without any emphasis on its sustainability in agriculture. Thus, in this study, apart from performance, an ergonomic evaluation and "strength, weakness, opportunity, and threats (SWOT)" analysis were performed on the existing and modified reapers. Furthermore, for the framework design and assessment of the sustainability of the modified reaper in the agricultural sectors, both "fuzzy logic" and metaheuristics-based optimization algorithms such as "Particle Swarm Optimization (PSO)" were utilized. Given the prevalence of small-scale farmers with limited farm sizes, the findings of this study may be relevant for more sustainable developments in the existing tools and equipment used in agriculture that can be easily affordable and utilized by all the farming community around the world.



URL: https://link.springer.com/article/10.1007/s10668-022-02768-8

Journal Name: Proceedings of the Institution of Mechanical Engineers, Part N: Journal of Nanomaterials, Nanoengineering and Nanosystems **IF: 4.2**

Title: Stability and sedimentation characteristics of water based Al2O3 and TiO2 nanofluids

Author: Mukherjee S., Chakrabarty S., Mishra P.C., Chaudhuri P.

Details: Volume 238, Issue 1-2, Pages 17 – 30, March-June 2024

Abstract: Nanofluids are regarded as promising heat transfer fluid due to their ultrafast cooling capability. However, stability analysis of nanofluids is very critical before its application in heat transfer .The present paper reports about an investigation on the stability of water-based Al2O3 and TiO2 nanofluids at ambient temperature. Nanoparticles, namely Al2O3 and TiO2 at different concentrations of 1, 0.5, 0.1, 0.05, and 0.01 wt.% respectively were directly dispersed in water without adding any dispersant and placed in a static container to observe gravitation settling. Change of sedimentation height with respect to time was measured using the sedimentation photograph capturing method. DLS (Dynamic Light Scattering) and zeta potential analysis were also executed to examine the stability of nanofluids. The results show that the visualization method, DLS and zeta potential analysis are in good correspondence to each other. Sedimentation velocity increases with an increase in nanoparticle concentration and aging. Brownian motion of nanoparticles resist the sedimentation in nanofluids. It is observed that TiO2nanofluid is more stable as compared to Al2O3 nanofluid due to its smaller particle size. Finally authors recommend smaller particle size, optimized sonication time, low nanoparticle concentration and use of surfactant to obtain better dispersion stability of nanofluids

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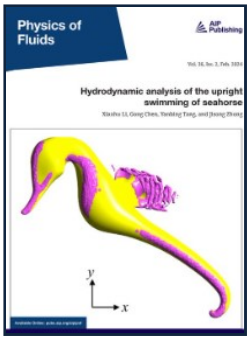
Journal Name: Physics of Fluids **IF: 4.1**

Title: Characterization of droplet impact dynamics onto a stationary solid torus

Author: Sahoo P.C., Senapati J.R., Rana B.K.

Details: Volume 36, Issue 2, February 2024

Abstract: The impingement mechanism of a liquid droplet on a solid torus surface is demonstrated using numerical simulations and an analytical approach. A computational model employing the volume of fluid method is developed to conduct simulations for the present investigation. Several influencing parameters, namely, diameter ratio ðD$_t$=D$_o$Þ, contact angle ðhÞ, initial droplet velocity (described by Weber number, We), surface tension (specified by Bond number, Bo), and viscosity of liquid drop (described by Ohnesorge number, Oh) are employed to characterize the impacting dynamics of a water drop onto a stationary toroidal substrate. The pattern of temporal and maximum deformation factors is elaborated by considering various relevant influencing factors to describe the fluidic behavior of the drop impingement mechanism. The key findings indicate that the developed central film gets ruptured at the early stage when the value of D$_t$=D$_o$ is lower because a relatively thin film is developed. Concomitantly, the very tiny drops get pinched off at D$_t$=D$_o$ ¼ 0.83, whereas the detached drops are relatively large-sized in the case of lower D$_t$=D$_o$ ¼ 0.16 due to the higher drainage rate of liquid mass through the hole at lower D$_t$=D$_o$. It is also revealed that the first pinch-off is found to be faster with the continual upsurge of We for a specific value of D$_t$=D$_o$ and h. Aside from that, efforts are made to show a scattered regime map in order to differentiate the pattern of droplet configuration during impingement. We have also attempted to establish a correlation that effectively characterizes the maximum deformation factor, which closely matches with the numerical findings. The developed correlation exhibits a firm agreement with the numerical data within deviations of 8.5%. Finally, an analytical framework is formulated to predict the deformations factor, which closely agrees with the computational findings.



URL: https://pubs.aip.org/aip/pof/article-abstract/36/2/022117/3266642/Characterization-of-droplet-impact-dynamics-onto-a?redirectedFrom=fulltext