

5th International Conference and Expo on

Ceramics and Composite Materials

June 03-04, 2019 | London, UK

Improving wear performance of multi-layer electroless Ni-based coating using laser heat treatment

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The industrial application of electroless nickel (EN) based plating in automobile, maritime and spacecraft parts manufacturing sector is growing by the day due to its high hardness, uniform thickness deposition as well as its excellent thermal, wear, impact and corrosion resistance. In this study, emphasis is on the formulation and deposition of multilayer duplex Ni-P/Ni-W-P coatings; as well as the observed microstructural and tribology behaviour changes between the as-deposited and laser treated coatings. The coatings were obtained from acidic electroless bath. The supersaturated as-deposited coats were observed to have been strengthened by precipitation of nickel phosphide crystallites as a result of controlled and suitable laser treatment. The morphological transformation was confirmed using optical and SEM while the observed change in mechanical property (increased wear resistance) was evaluated using pin-on-disc test apparatus. The results show the case of laser treated Ni-P/Ni-W-P duplex coatings offering better grain orientation/recrystallization, reduced porosity formation and improved wear resistance than in the as-deposited coatings.

Recent Publications

1. Oloyede O R, Bigg T D, Cochrane R F and Mullis A M (2016) Microstructure evolution and mechanical properties of drop-tube processed, rapidly solidified grey cast iron. *Journal of Materials Science and Engineering A*. 654:143-150.
2. Oloyede O R, Cochrane R F and Mullis A M (2017) Effect of rapid solidification on the microstructure and microhardness of BS1452 grade hypoeutectic grey cast iron. *Journal of Alloys and Compounds*. 707:347-350.
3. Islam M, Azhar M R, Khalid Y K, Khan R, Abdo H S, Dar M A, Oloyede O R and Burleigh T D (2015) Electroless Ni-P/SiC Nanocomposite Coatings with Small Amounts of SiC Nanoparticles for Super Corrosion Resistance and Hardness. *Journal of Materials Engineering & Performance*, 24(12):4835-4843.
4. Islam M, Azhar M R, Fredj N, Burleigh T D, Oloyede O R, Almajid S and Shah S I (2015) Influence of SiO₂ nanoparticles on hardness and Corrosion resistance of electroless Ni-P coatings. *Surface & Coating Technology* 261:141-148.

Biography

Oloyede O R is a dynamic scholar and research oriented fellow with track record of publications in notable international journals, who believes in solving industrial challenges through critical thinking. He is a specialist in Materials characterization, fabrication and corrosion control with excellent practical, teaching, and supervisory skills gathered over the years. He is a senior lecturer in the Mechanical Engineering Department, Afe Babalola University, Nigeria. He is dedicated to academic excellence and his focus has been to remain a bridge and catalyst to lasting legacy in sound research and innovation in Materials & Mechanical Engineering worldwide! Dr. Oloyede, is an adaptable, resourceful and efficient researcher with excellent communication skills in the field of Advanced Materials. He is a consultant to Universities and firms in Nigeria, and he is constantly contributing to the world's body of knowledge by adding values to engineering materials evolution, stability and better usage worldwide.

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