

Pembuatan coating komposit ni-p-nano powder Al_2O_3 dengan metode electroless co-deposisi untuk aplikasi steam turbin di pembangkit listrik tenaga panas bumi (pltp) = Synthesis of ni p Al_2O_3 nano powder composite coating by electroless co deposition method for steam turbine in geothermal source energy application

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Abstrak

ABSTRAK

Coating Ni-P-nano powder Al_2O_3 yang dibuat dengan metode electroless kodeposisi memiliki keunggulan yaitu prosesnya tidak membutuhkan elektroda, laju deposisi yang cepat dan memiliki ketahanan korosi dan aus yang baik. Pada penelitian ini, parameter yang divariasi adalah komposisi penambahan nano powder Al_2O_3 dan temperatur heat treatment setelah proses electroless. Penelitian ini bertujuan untuk mengetahui fenomena struktur mikro, fasa dan kristalinitas, komposisi kimia dan distribusi unsur di permukaan coating, dan ketahanan korosi komposit coating Ni-P-nano powder Al_2O_3 . Substrat yang digunakan yaitu Stainless Steel 410 di pretreatment untuk mengaktifasi permukaan, kemudian direndam dalam larutan yang terdiri dari nikel sulfat, natrium hypophosphite, ammonium sulfat, sodium asetat, lead asetat dan serbuk nano alumina. Substrat direndam selama 60 menit, dalam suhu proses $90 \pm 2^\circ\text{C}$ dengan kecepatan putaran 150 rpm. Setelah proses electroless coating, substrat kemudian di heat treatment pada suhu 300, 400 dan 500°C . Karakterisasi sampel dilakukan menggunakan alat SEMEDS, XRD, dan CMS. Dari hasil percobaan menunjukkan terdapat perbedaan visual antara substrat logam dasar, substrat setelah proses electroless coating, dan substrat setelah diheat treatment. Berdasarkan variabel percobaan, untuk komposisi nano powder Al_2O_3 yang optimum adalah 10 gr/l dan temperatur heat treatment 400°C karena memberikan distribusi partikel dan ketahanan korosi yang paling baik.

<hr><i>ABSTRACT</i>

The Ni-P-nano powder Al_2O_3 composite coating have been prepared by electroless codeposition method. It has advantage that the process does not require an electrode, fast deposition rate, good corrosion and wear resistance. In this study, the parameters are varied is the addition of nano powder Al_2O_3 composition and heat treatment temperature after electroless process. The aim of this research is to determine microstructure phenomenon, phase and crystallinity, chemical composition and distribution on coating surface, and corrosivity Ni-P-nano powder Al_2O_3 composite coating. The substrate is used stainless steel 410. Substrates have been pre treated in order to activate the surface. Then, substrate immersed in solution that consisting of nickel sulfate, sodium hypophosphite, ammonium sulfate, sodium acetate, lead acetate dan nano alumina powder. The substrate is immersed about 60 minutes at a $90 \pm 2^\circ\text{C}$ temperature with speed of 150 rpm. After electroless coating process, the substrate is heat treated at 300, 400, and 500°C temperatures. Sample characterization has done by SEM-EDS, XRD, and CMS. From the experimental results indicate there is a visual difference between substrate before and after electroless coating, and after heat treatment process. Based on variable experinment, the optimum nanopowder Al_2O_3 composition is 10 gr/l and a temperature heat treatment of 400°C which have given the best paticle distribution and most excellent corrosion resistance.</i>