Northern Technical University / Dour Technical Institute /

personal information

Full name	Omar Hasan Mahmood Al-Doori
The scientific title	Assistant lecture
employment position	
Department	Al-door technical institute
Branch	Mechanical technics
E-mail	Eng.omarhasan94@ntu.edu.iq

Academic certificates:

University	Academic certificate	date of the certificate	Specialization	Country
Tikrit	Bachelor	2015	Mechanical engineering	Iraq
Tikrit	Master degree	2019	Mechanical engineering-production and metallurgy	Iraq

Teaching experience

undergraduate	4 years

Research and scientific activity

IRAQI Academic Scientific Journals

Tikrit Journal of Engineering Sciences (2021) 28 (1): 13-20

College of Engineering

ISSN: 1813-162X (Print); 2312-7589 (Online)

Tikrit Journal of Engineering Sciences

available online at: http://www.tj-es.com

TJES Tikrit Journal of Engineering Sciences

Farouk M. Mahdi, Omar H. Mahmood. Effect of Adding Nano Ag on Mechanical and Physical Properties of Cu–10% Fe Prepared by Powder Metallurgy Technique. *Tikrit Journal of Engineering Sciences* 2021; 28 (1): 13- 20.

Effect of Adding Nano Ag on Mechanical and Physical Properties of Cu–10% Fe Prepared by Powder Metallurgy Technique

Farouk M. Mahdi *

Omar H. Mahmood

Department of Mechanical Engineering (Production and Metallurgy), College of Engineering, Tikrit University, Tikrit, Iraq

Keywords:

Cu-Fe composite
Electrical conductivity
Bulk density
Compression strength
Wear rate.

ARTICLE INFO

Article history:

Received	15 Oct. 2020
Accepted	01 Mar. 2021
Available online	26 Mar. 2021

ABSTRACT

Copper-matrix composites have received a lot of attention and are used widely in various applications, such as electronics, machinery, automobile, military and aerospace; because of their remarkable electrical conductivity, high thermal conductivity and excellent mechanical properties. Among these are copper-iron composites which found many engineering applications due to the role of Fe in enhancing the mechanical properties of these composites beside its low cost. However, Fe addition reduces electrical and thermal conductivity therefore, binary Cu-Fe composites are not suitable for applications where these properties are the main requirement. Many studies have been done to enhance these properties by the addition of alloying elements. The present work aims to study the effect of adding Nano Ag on mechanical and physical properties of Cu-10 wt% Fe composites prepared by powder metallurgy technique. The results showed the effectiveness of Nano Ag in enhancing both mechanical and physical properties of Cu-10 wt% Fe composite. It is found that bulk density, electrical conductivity, and thermal conductivity have been increased by 1.19%, 46%, and 46% respectively on adding 5% Nano Ag. Hardness and compression strength have been increased by 17.3% and 32.8% respectively by adding 4% Nano Ag, while wear rate was reduced by 13.4% by adding 4% Nano Ag.

DOI: http://dx.doi.org/10.25130/tjes.28.1.02

* Corresponding AuthorE-mail: farouk_1959_1996@tu.edu.iq

IRAQI Academic Scientific Journals

Tikrit Journal of Engineering Sciences (2020) 27 (3): 67-72

College of Engineering

ISSN: 1813-162X (Print) ; 2312-7589 (Online)

Tikrit Journal of Engineering Sciences

available online at: http://www.tj-es.com

TJES Tikrit Journal of Engineering Sciences

Mahdi FM, Mahmood OH, Alabdraba WM. Effect of Yttrium Oxide on Mechanical and Physical Properties of Fe–10%Cu Composite. *Tikrit Journal of Engineering Sciences* 2020; **27**(3): 67- 72.

Farouk M. Mahdi, *

Omar H.Mahmood

Department of Mechanical Engineering (Production and Metallurgy)/ Engineering College/Tikrit University/ Tikrit, Iraq

Effect of Yttrium Oxide on Mechanical and Physical Properties of Fe–10%Cu Composite

Keywords:

powder metallurgy, Fe-metal matrix composites, ceramic reinforcement.

ARTICLE INFO

Article history:

Received	11 Sep. 2018
Accepted	31 Dec. 2018
Available online	01 July 2020

ABSTRACT

Iron-based composites have found a lot of industrial applications such as bearings, camshafts, connecting rods, pulleys, various valves, oil pump gears and many other applications in the automotive and other industries due to their low cost, availability, and high strength. The present study aims to prepare Fe-10 vol.% Cu - (0 – 5) wt.% nano Y_2O_3 composites by powder metallurgy technique and studying their physical and mechanical properties. The powders were mixed into ball mill for 30 minutes, followed by room temperature uniaxial compaction at 700 MPa for 3 minutes. The green specimens were sintered at 1000 °C for 1 hour. The results of the present study showed that nano yttrium oxide has significant effects on both physical and mechanical properties of Fe-10%Cu composite. The bulk density was increased by 0.92% and the true porosity was decreased by 6.4% on increasing the nano oxide content from 0% to 3% respectively. Vickers microhardness was increased by 5.9% on increasing Y_2O_3 up to 1% followed by gradual decrease on further increase above 1%. Wear rate was decreased by 21% on increasing the nano oxide content from 0% to 3%. On the other hand, the compressive strength was decreased by 47% on increasing Y_2O_3 up to 5%.

DOI: http://doi.org/10.25130/tjes.27.3.08

تأثير أوكسيد اليتيريوم النانوي على الخواص الميكانيكية والفيزيائية لمتراكب حديد – 10%نحاس

فاروق منصور مهدي/ قسم الهندسة الميكانيكية/ كلية الهندسة/ جامعة تكريت/ العراق

عمر محمود / قسم الهندسة الميكانيكية/ كلية الهندسة/ جامعة تكريت/ العراق

الخلاصة

وجدت متراكبات الاساس الحديدي تطبيقات صناعية عديدة منها كراسي التحميل وأعمدة الحدبات وأذرع التوصيل والبكرات والصمامات وتروس مضخات الزيت وتطبيقات كثيرة أخرى في صناعة السيارات وغيرها من الصناعات بسبب وفرة المساحيق الحديدية وانخفاض كلفتها، علاوة على متانتها العالية. تهدف الدراسة الحالية الى تحضير متراكبات حديد-10%نحاس- (0-5)% اوكسيد الايتيريوم النانوي بطريقة ميتالورجيا المساحيق ودراسة خواصها الفيزيائية والميكانيكية. تم خلط المساحيق باستخدام طاحونة كرات فولاذية وتم تحضير النماذج عن طريق الكبس البارد أحادي الاتجاه بضغط مقداره (700MPa) وابقائه تحت الضغط لمدة (3) دقائق. لبدت النماذج الخضراء بدرجة حرارة(1000°C) لمدة ساعة واحدة وتركت لتبرد داخل الفرن إلى درجة حرارة الغرفة. اظهرت النتائج وجود تأثير فاعل لأوكسيد الايتيريوم النانوي على الخواص الفيزيائية والميكانيكية للمتراكب، إذ زادت الكثافة بنسبة (0.92%) وانخفضت المسامية بنسبة (6.4%) مع زيادة محتوى اوكسيد الايتيريوم من 0% إلى 3% على التوالي. وزادت الصلادة بنسبة(5.89%) عند زيادة محتوى الأوكسيد النانوي لغاية 1% ثم انخفضت تدريجيا بزيادة محتواه فوق هذه النسبة. اما معدل البلى فقد قل بنسبة (21%)مع زيادة نسبة الأوكسيد النانوي من

* *Corresponding author: E-mail* : farouk_1959_1996@tu.edu.iq

Profiles

Google Scholar Profile	
Researcgate Profile	https://www.researchgate.net/profile/Omar-Hasan-14
Publons Profile	**http://www.webofscience.com/wos/author/record/[**HNP-1390-2023**]**
ORCID iD	https://orcid.org/**0009-0005-2131-7810**
Elsevier Account Settings	
researchid	https://researchid.co/omarhasan94

Scientific and research interests:

Honours and Awards

Issued by	Title of Achievement