REVIEW ON DESIGN AND DEVELOPMENT OF POWDER COATED BEARING

Rahul Gautam[1],Gaurav Nagdeve[2]

[1] *B. E student, Department of Mechanical Engineering, A.G.P.C.E Nagpur, Maharastra, India*
[2] *Asst. Professor, Department of Mechanical Engineering, A.G.P.C.E Nagpur, Maharastra, India*

ABSTRACT

Powder coating is a dry finishing process that has become extremely popular since its introduction in North America over in the 1960s. Representing over 15% of the total industrial finishing market, powder is used on a wide array of products. More and more companies specify powder coatings for a high-quality, durable finish, allowing for maximized production, improved efficiencies, and simplified environmental compliance. Used as functional (protective) and decorative finishes, powder coatings are available in an almost limitless range of colors and textures, and technological advancements have resulted in excellent performance properties. Powder metallurgy (PM) has entered the biomedical domain since the 1970s when the concept of using porous metals for osseointegration was first investigated

Keyword: - *Mechanical properties, Corrosion behaviour,Coating.*

---

1. INTRODUCTION

Mechanical alloying (MA) is a solid-state powder processing technique involving repeated welding, fracturing, and rewelding of powder particles in a high-energy ball mill. Compliant foil bearings offer many advantages over rolling element bearings in high-speed and high-temperature applications. However, implementation of foil bearings in these applications requires development of solid lubricant coatings that can survive the severe operating conditions encountered at high speeds and high temperatures. A water-in-oil micro-emulsion method has been applied for the preparation of silica-coated iron oxide nanoparticles. Three different nonionic surfactants (Triton X-100, Igepal CO-520, and Brij-97) have been used for the preparation of micro-emulsions, and their effects on the particle size, crystallinity, and the magnetic properties have been studied. The iron oxide nanoparticles are formed by the co-precipitation reaction of ferrous and ferric salts with inorganic bases. A strong base, NaOH, and a comparatively mild base, NH4OH, have been used in each surfactant to observe whether the basicity has some influence on the crystallization process during particle formation. Nanostructured materials have the potential to change materials science as we know it today significantly, as well as to provide a new generation of materials with a quantum improvement in properties. While many interesting properties have been generated in the laboratory, there is still much work to be done before there are production applications for nanostructured materials and coatings in gas turbine engines and similar demanding strength- and temperature-limited applications.

2. MATERIAL AND METHOD

2.1. Materials:

FeSO4Æ7H2O was purchased from Qualigens Fine Chemicals. N-Cetyl-N,N,N-trimethyl ammonium bromide (CTAB), HCl,HCOOH, NaOH, sodium dodecyl sulfate (SDS), and Cu(NO3)2, Pb(NO3)2, Ni(NO3)2 were obtained from CDH Ltd., India. Metal ion solutions were prepared by dissolving appropriate amount of metal salt in double distilled water.

2.2. Equipments:

The concentration of Cu2+ in the aqueous solution was analysed using atomic absorption spectroscopy (AAS) (GBC 902, Australia). The FTIR spectra of IOESP before and after Cu2+ adsorption were recorded in the frequency range of 400–4000 $cm^{-}1$ using FTIR spectrophotometer (Inter-spec 2020, Spectro lab, UK) in KBr pellets. pH measurements were made using a pH meter (Elico LI-120, India).

2.3. Preparation of iron oxide coated eggshell powder:

Hen eggshell waste was washed with distilled water and dried at 100^{0}C. Dried waste shell was crushed and converted to a fine powder of 100 BSS mesh particles. The fine eggshell powder was washed several times with distilled water and dried at 100^{0}C. Then 10 g eggshell powder immersed in 50 mL solution of FeSO4Æ7H2O (10 g) and 20 mL 5 N NaOH solution was added drop wise to precipitate the iron oxide on the surface of the eggshell powder. The solution was continuously stirred for 1 h. After that, iron oxide coated eggshell powder was filtered, washed several times and dried at 100^{0}C.

2.4. Determination point of zero charge (pHz):

The point of zero charge (pHz) was to be investigated to find the surface charge of IOESP. For the determination of pHz, 0.1M KCl was prepared and its initial pH was adjusted between 2.0 and 12.0 by using NaOH and HCl. Then, 25 mL of 0.1 M KCl was taken in the 100 mL flasks and 0.05 g of IOESP was added to each solution. These flasks were kept for 24 h and the final pH of the solutions was measured by using a pH meter. Graphs were plotted between pH final and pHinitial (Sharma et al., 2009).

2.5. Different coating materials:

The different coating materials are as follows.

2.5.1 Nickel Aluminum + Nickel Molybdenum

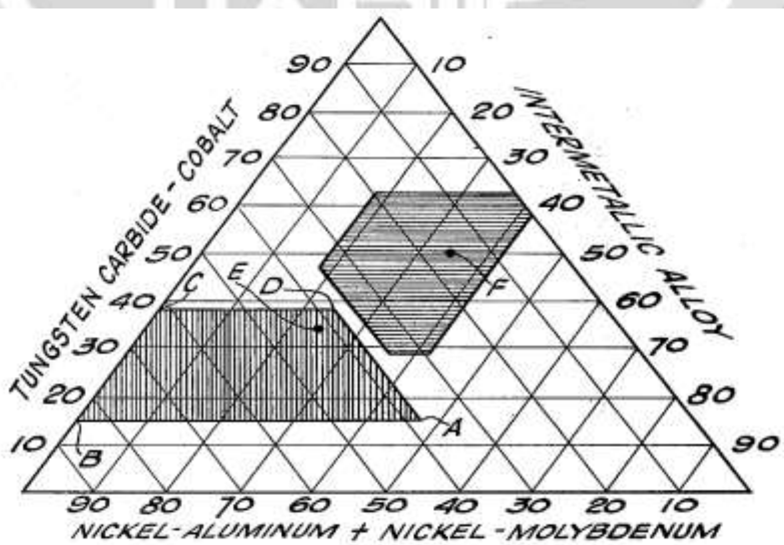

Figure:2.1 Nickel Aluminum+ Nickel Molybdenum

Table 2.1 Nickel Aluminum+ Nickel Molybdenum

MATERIAL	A	B	C	D	PREFERRED
NI - AL	10.5 - 0	10.5 - 0	10.5 - 0	10.5 - 0	10.5
NI - MO	26.7 - 37.2	74.5 - 85.0	50.5 - 61.0	26.7 - 37.2	30.0
WC - CO	15.0 - 15.0	15.0 - 15.0	39.0 - 39.0	39.0 - 39.0	35.0
INTERMET.	47.8 - 47.8	0 - 0	0 - 0	23.8 - 23.8	24.5

2.5.2 Cobalt-Molybdenum Alloy

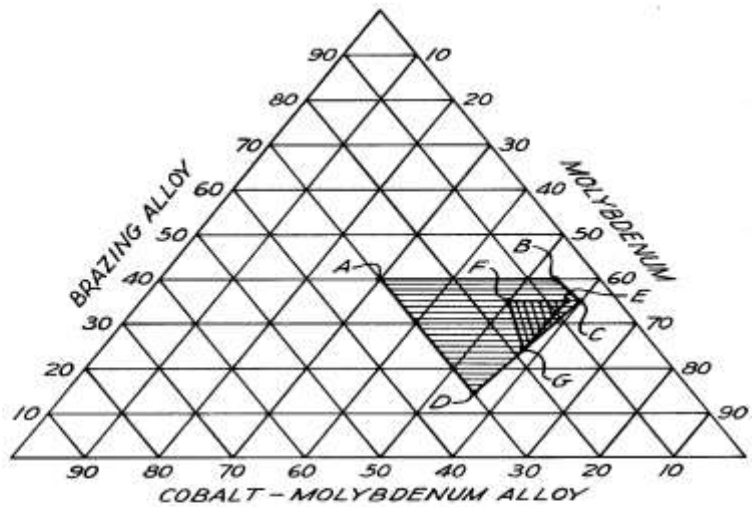

Figure: 2.2 Cobalt-Molybdenum Alloy

Table 2.2 Cobalt-Molybdenum Alloy

MATERIAL	A	B	C	D	E	F	G
BRAZING	40	40	35	15	35	35	25
MO	30	53	60	55	58.3	50	58.3
CO-MO	30	7	5	30	6.7	15	16.7

3. CONCLUSIONS

Thus we have studied various properties of various materials.

4. REFERENCES

[1] Gupta, V.K., 1998. Equilibrium uptake, sorption dynamics, process development, and column operations for the removal of copper and nickel from aqueous solution and wastewater using activated slag, a low-cost adsorbent. Ind. Eng. Chem. Res. 37, 192–202.

[2] Larous, S., Meniai, A.H., Lehocine, M.B., 2005. Experimental study of the removal of copper from aqueous solutions by adsorption using sawdust. Desalination 185, 483–490.

[3] Vijayaraghavan, K., Jegan, J., Palanivelu, K., Velan, M., 2005. Removal and recovery of copper from aqueous solution by eggshell in a packed column. Miner. Eng. 18, 545–547.

[4] ‘Method for determination of green strength of compacted metal powder specimens’, Standard 15, Metal Powder Industries Federation, Princeton, NJ, USA, 1990.

[5] M. Peuster, C. Hesse, T. Schloo, C. Fink, P. Beerbaum and C. von Schnakenburg: Biomaterials, 2006, 27, 4955–4962.

[6] Gupta, V.K., Rastogi, A., Nayak, A., 2010b. Biosorption of nickel onto treated alga (Oedogonium hatei): application of isotherm and kinetic models. J. Colloid Interf. Sci. 342, 533–539.

[7] 'Standard test methods for determination of carbon, sulphur, nitrogen, and oxygen in steel and in iron, nickel, and cobalt alloys', Standard E1019-03, ASTM, West Conshohocken, PA, USA, 2006.

[8] Sharma, Y.C., Srivastava, 2010. Separation of Ni(II) ions from aqueous solutions by magnetic nanoparticles. J. Chem. Eng. Data 55, 1441–1442.

[9] Standard test methods for tension testing of metallic materials', Standard E8-04, ASTM, West Conshohocken, PA, USA, 2006.

[10] Han, R.P., Zhang, J.H., Zhu, L., Zou, W.H., Shi, J., 2006. Determination of the equilibrium, kinetic and thermodynamic parameters of the batch biosorption of copper(II) ions onto chaff. Life Sci. J. 3, 81–88.

[11] 'Standard test method for elements in water by inductively-coupled argon plasma atomic emission spectroscopy', Standard D1976-02, ASTM, West Conshohocken, PA, USA, 2006.

[12] Gupta, V.K., Carrott, P.J.M., Ribeiro Carrott, M.M.L., Suhas, 2009. Low-cost adsorbents: growing approach to wastewater treatment–a review. Crit. Rev. Environ. Sci. Technol. 39, 783–842.

[13] I. N. Bogachev, V. F. Yegolayev, G. Y. Zvigintseva and L. V. Zhuravel: Phys. Met. Metallogr., 1969, 28, 125–130.

[14] Soliman, E.M., Ahmed, S.A., Fadl, A.A., 2010. Reactivity of sugar cane bagasse as a natural solid phase extractor for selective removal of Fe(III) and heavy-metal ions from natural water samples. Arabian J. Chem. doi: 10.1016/j.arabjc.2010.06.021.

[15] C. L. Keen, J. L. Ensunsa and M. S. Clegg: in 'Manganese and its role in biological processes', (ed. A. Siegel and H. Siegel), 89–121; 2000, New York, Marcel Dekker.

[16] Zhang, S., Li, X.Y., Chen, J.P., 2010. Preparation and evaluation of a magnetite-doped activated carbon fiber for enhanced arsenic removal. Carbon 48, 60–67.

[17] Kiraly, Z., Findenegg, G.H., Klumpp, E., Schlimper, H., Dekany, I., 2001. Adsorption calorimetric study of the organization of sodium n-decyl sulfate at the graphite/solution interface. Langmuir 17, 2420–2425.

[18] Rao, R.A.K., Khan, M.A., Jeon, B.H., 2010. Utilization of carbon derived from mustard oil cake (CMOC) for the removal of bivalent metal ions: effect of anionic surfactant on the removal and recovery. J. Hazard. Mater. 173, 273–282.

[19] B. Bhargava, N. K. Reddy, G. Karthikeyan, R. Raju, S. Mishra, S. Singh, R. Waksman, R. Virmani, and B. Somaraju: Catheter. Cardiovasc. Interv., 2006, 67, 698–702.

[20] Kiraly, Z., Findenegg, G.H., Klumpp, E., Schlimper, H., Dekany, I., 2001. Adsorption calorimetric study of the organization of sodium n-decyl sulfate at the graphite/solution interface. Langmuir 17, 2420–2425.