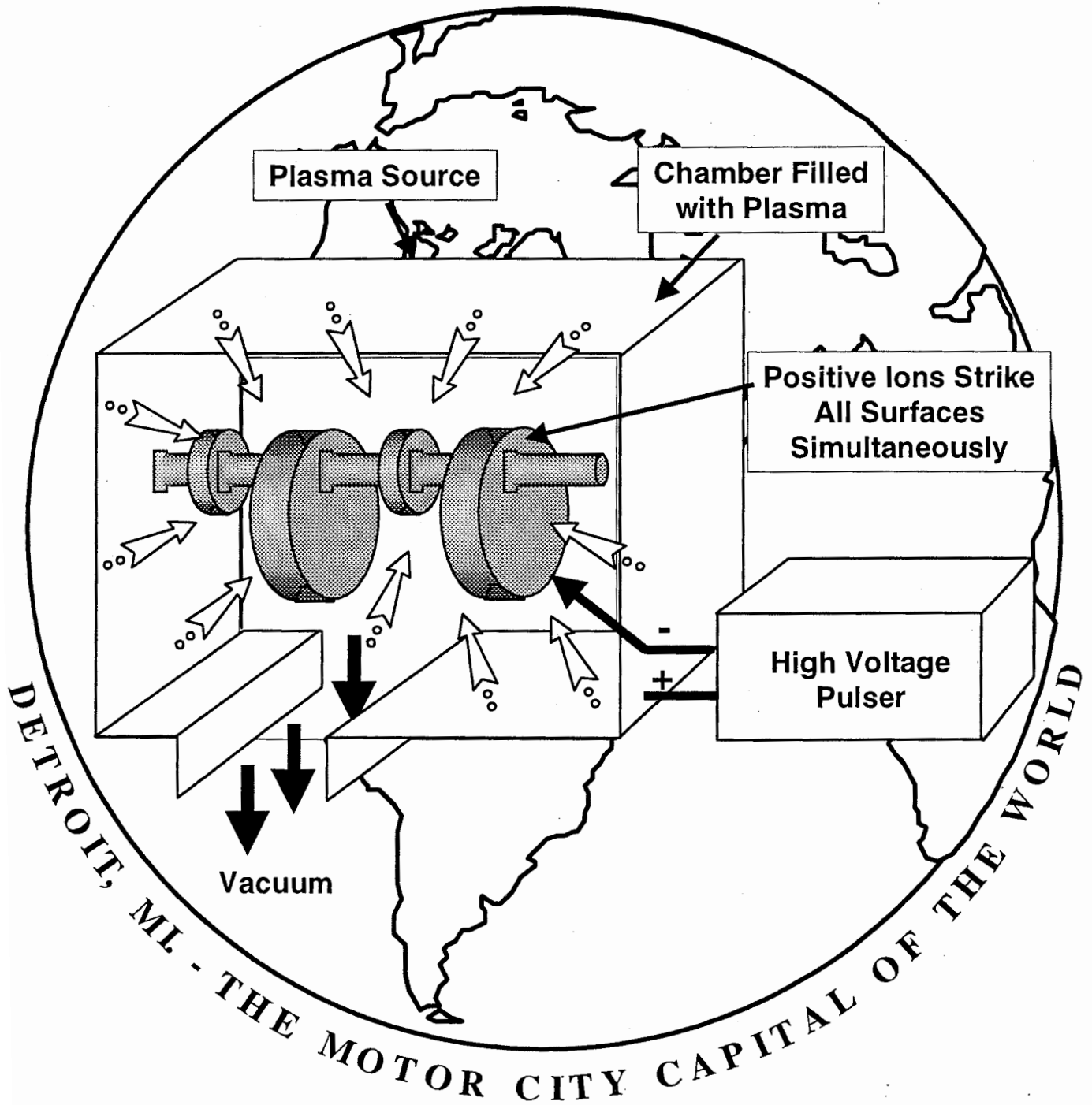


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**SURFACE PROPERTY ENHANCEMENT OF
9Cr18 STEEL USING PLASMA IMMERSION ION IMPLANTATION**

Z. M. ZENG ^{a,b}, B. Y. TANG ^a, P. K. CHU ^a, X. B. TIAN ^{a,b}, S. Y. WANG ^a and X. F. WANG ^{a,b}

^a Department of Physics and Materials Science, City University of Hong Kong,

83 Tat Chee Avenue, Kowloon, Hong Kong

^b "Advanced Welding Production & Technology" National Key Lab, Harbin Institute of Technology, Harbin, P.R.China,150001

9Cr18 martensite steel is commonly used as aerospace bearing materials in China. Its chemical composition is as follows: C 0.9~1.00, Si 0.80, Mn 0.80, P 0.035, S 0.03, Cr 17.0~19.0 wt%. Because of its high Cr content, nitrogen ion implantation is a good technique to increase the wear resistance of 9Cr18 precision bearing to extend its working lifetime. We have recently used plasma immersion ion implantation (PIII) to improve the surface properties of this material and industrial components made of 9Cr18 steel. The effectiveness of nitrogen plasma generated by two different means, low pressure gas discharge ignited by means of heated filament hot electron emission in vacuum and radio-frequency glow discharge using a 13.56MHZ, 2KW RF plasma source, is compared. The surface properties of 9Cr18 steel before and after nitrogen ion implantation are investigated by measuring the microhardness, wear property, coefficient of friction, corrosion resistance, as well as elemental depth profiles acquired by AES. It is found that nitrogen ion implantation at various doses and under the two different plasma conditions both significantly enhance the surface properties of the materials. In this paper, we will summarize our results and compare the efficacy of the treatment processes.