

# Surface Alloying of Aluminium alloys by Diffusion Coating

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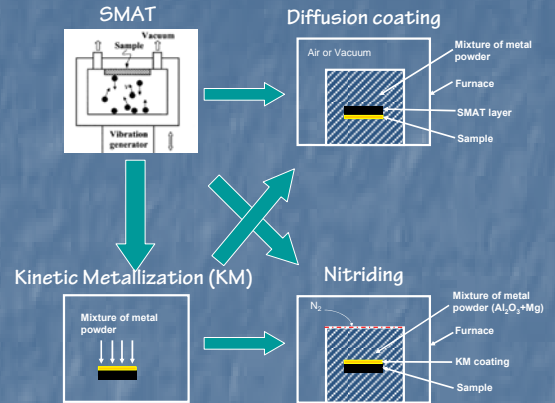
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## Introduction

Surface alloying is an efficient and inexpensive technique to improve the wear resistance of aluminium alloys. To lower the treatment temperature and to stimulate the formation of thicker alloyed layer, surface mechanical attrition treatment (SMAT) has been used to activate the surface through surface nanocrystallization. As a consequence of SMAT, surface alloying treatment has been carried out in three ways: (i) Diffusion coating in loose metal powder mixture; (ii) nitriding in nitrogen; and (iii) combination with the Kinetic Metallization (KM) technique.

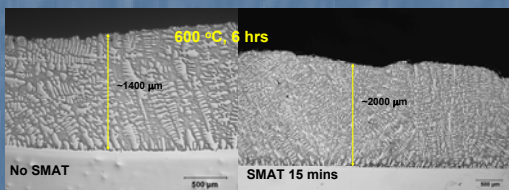
Experimental results will be presented. Novel treatment routes may enable diffusion coating, which is generally difficult in aluminium alloys, such as the surface nitriding of aluminium alloys, feasible.

## Experimental Methodology

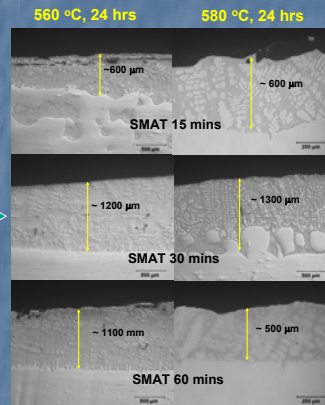


## Experimental Results

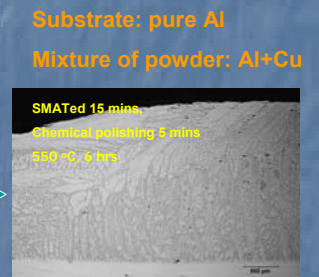
### Diffusion coating in loose metal powder mixture



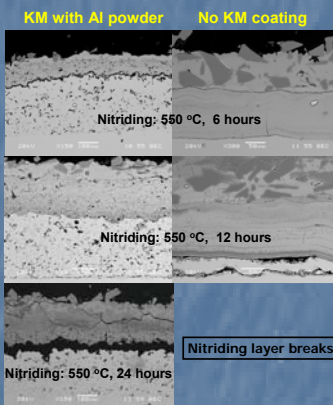
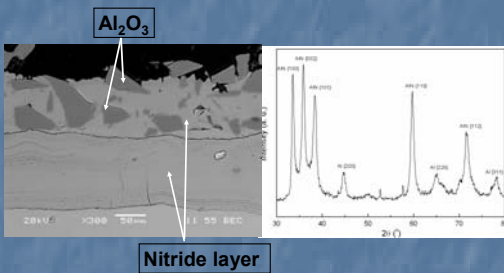
Lower process temperature



Lower process temperature

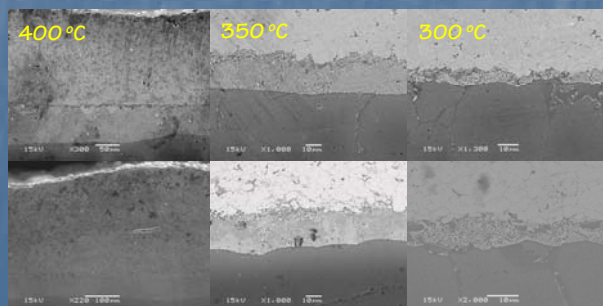


### Nitriding in nitrogen



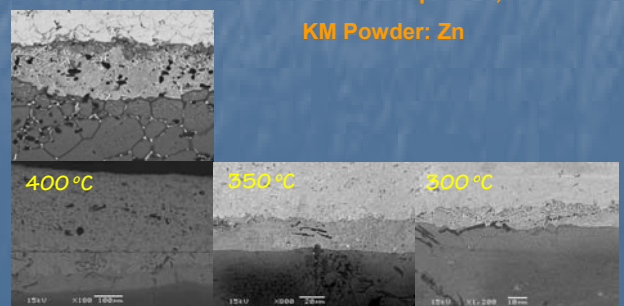
Substrate: pure Al, pure Al with Al coating; Mixture of powder: Al<sub>2</sub>O<sub>3</sub>+Mg

### Combination with Kinetic Metallization (KM) technique



SMAT

No SMAT



Substrate: pure Al, Al601  
KM Powder: Zn