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STUDYING ABOUT THE ALLOY COATING OF ELECTROLESS NICKEL

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ABSTRACT

It will be understood as a science of studying how research is done scientifically. The study highlights the methodology and process used to conduct the present research, the objectives, and the procedures of the study. When appropriately conducted, research reduces any kind of ambiguity and brings clarity to the result and thus becomes helpful for the study to plan its goals and objectives accordingly. Chemical and electrochemical methods find many more applications in studies of metal-semiconductor contacts and metal-dielectric combinations. As a matter of fact, the scope of research in aforesaid areas has great potentialities and it is hoped that the methods developed by the author will be of some help in the study of many more problems of m-s contacts and metal-dielectric combinations. The main aim of the study is to the Chemical and Electrochemical Process in Contact deposition method and Chemical reduction method and Principle of Electro less Nickel Plating. And major factors that Earlier Works on Electro less Nickel Plating. Electro less Nickel Plating For Making Low Resistance Ohmic Contacts to Silicon.

Keywords: - Metal, Electro less, Silicon, Coating, Alkaline

I. INTRODUCTION

ELECTROLESS NICKEL ALLOY COATING

Acid bath Ni-P alloy

The hot acid solutions were found to have several advantages over alkaline solutions. Hot acid electro less nickel baths are used almost exclusively for the deposition of relatively thick coatings onto metals. The coatings obtained from the acid solution are of better quality and the bath solution is more stable during plating. Thermal stability upon heating (crystallization) should not depend on solution, however. The phosphorus content can be controlled easily in due respect of their properties.

Alkaline bath Ni-P alloy

Hot alkaline nickel-phosphorus deposits are generally reduced by sodium hypophosphite. A typical bath composition is 30 g/l nickel chloride, 10 g/l sodium hypophosphite, 65 g/l ammonium citrate, and 50 g/l ammonium chloride. Operating conditions are pH 8-10,

temperature 80-90°C, giving a deposition rate of 10 µm/h. The main disadvantage of the alkaline solution is its high instability at temperature above 90°C, where bath pH suddenly decreases due to loss of ammonia. As a main advantage, the alkaline low temperature bath is a convenient way to deposit nickel on plastics. A typical bath composition is 20 g/l nickel chloride, 24 g/l sodium hypophosphite, 45 g/l sodium citrate, and 30 g/l ammonium chloride. Operating conditions are pH 8-9, temperature 30-40°C, giving a deposition rate of 8 µm/h. Deposits provide good solderability for the electronic industry. However, lower corrosion resistance, lower adhesion to steel and difficulty in processing aluminum due to high pH values are the limitations.

Acid bath Ni-B alloy

DMAB is usually used as a reducing agent in acid bath for electroless nickel-boron coatings where boron contents vary from 0.1 to 4%. The main advantage of the hot acid bath is its stability and deposits from this bath have a very high melting point of ~1,350°C. They are very often used in industrial wear applications for their as-plated hardness, which is higher than that of nickel-phosphorus. They have good soldering, brazing and ultrasonic bonding characteristics, when boron is >1%. Boron can be usually reduced by alkyl amine, although up to 5% can be obtained by using some accelerator.

Alkaline bath Ni-B alloy

The boron contents of the alkaline electroless nickel-boron deposit range from 0.2 to 4 wt.% and from 4 to 7 wt.% when the reducing agents are aminoborane (N-alkyl amino boranes) and sodium borohydride, respectively. They are usually operated at temperature in the range of 20-90°C. Alkaline Ni-B cool bath has been preferred. At high temperature, bath becomes unstable and has limited industrial usage. These alkylamineborane baths generally have a much slower deposition rate. Complexing agents such as ethylendiamine are used to control nickel hydroxide precipitation.

Polyalloys

The electroless method is one of the elegant processes to deposit alloy coatings. Ternary and quaternary alloys are referred to in literature as polyalloys. Some alloys of Ni-Co-P, Ni-Fe-P and Ni-Co-Fe-P have been widely used because of their superior magnetic properties. High-coercivity films have been adopted for high-density recording, whereas lowcoactivity alloys have been suggested for high-speed computers. A ternary alloy Ni-Cu-P (1 at.% Cu) has high corrosion resistance and high ductility as compared with standard Ni-P alloy [66-67] . Ternary alloy containing molybdenum (Ni-Mo-B) has good solderability (17 at.% Mo, 0.3 at.% B) and its non-ferromagnetism makes it particularly useful in electronics industry.

II. METHODOLOGY

Research methodology is a way to systematically solve the research problem. It will be understood as a science of studying how research is done scientifically. The study highlights the methodology and process used to conduct the present research, the objectives, and the

procedures of the study. When appropriately conducted, research reduces any kind of ambiguity and brings clarity to the result and thus becomes helpful for the study to plan its goals and objectives accordingly.

Chemical and electrochemical methods find many more applications in studies of metal-semiconductor contacts and metal-dielectric combinations. As a matter of fact, the scope of research in aforesaid areas has great potentialities and it is hoped that the methods developed by the author will be of some help in the study of many more problems of m-s contacts and metal-dielectric combinations

- **Research Type**

The type of analysis defines the essence of the data in the study. Given the nature of the data, the work currently under way will a qualitative cum quantitative aspect, but is mainly quantitative in aspect, as most findings of this analysis are focused on quantified measures. The researcher exploited the victims and results, which also defined qualitative analysis.

- **Sample Design**

In certain cases of science, analyzing the entire universe is almost impossible; the only alternative will to use sampling. The current researches will the same character. The procedure for deciding the Chemical and electrochemical methods find many more applications in studies of metal-semiconductor contacts and metal-dielectric combinations. As a matter of fact, the scope of research in aforesaid areas will great potentialities and it is hoped that the methods developed by the author will be of some help in the study of many more problems of m-s contacts and metal-dielectrie combinations.

- **Data Collection**

Data collection is the systematic way to collect and measure data from sources to get complete and precise data for research activities. Current data collection is essential for preserving the credibility of research and for ensuring excellent outcomes and their findings. This study will be secondary research methods.

- **Secondary Data**

Secondary data are the data collected by an individual rather than the user. A researcher who is not associated with the analysis / recherché study collects secondary information for a different purpose, and in the past at quite different times such data are readily accessible and cost effective in comparison to primary data.

III. RESULTS AND DISCUSSION

MASK-FREE PATTERNING TECHNIQUES: DIRECT WRITING

The selective removal of the surface coating through a direct writing process can be performed by several technologies. By "direct writing", we mean here that the removal of the nitride is performed following a defined removal path.

Laser grooving

This technology was developed by the UNSW in the 80's. Laser grooves are formed on the surface by the removal of the ARC as well as part of the silicon underneath. The remaining laser damage is etched with an alkaline etching solution (KOH or NaOH). After a second phosphorus diffusion, the junction is rebuilt in the laser-treated areas. This technology is known as Laser-Grooved Buried Contact (LGBC) process.

Cells manufactured by this technology were commercialized by BP solar starting in 1992, under the name of Saturn modules.

Mechanical grooving/trenching

An alternative to the use of lasers for the formation of grooves is presented by the use of mechanical tools (e.g. dicing saw). It was patented by the UNSW in 1988. The finger depth and width are defined arbitrarily, allowing an interesting increase of the aspect ratio, and therefore reduction of the shadowing losses.

Laser ablation

The combination of the dielectric-layer laser-ablation process with nickel plating corresponds, together with inkjet printing and laser-chemical processing, to one of the three main technologies for the structuring of the front-side and nickel-plating metallization developed during this thesis.

IV. CONCLUSION

As an alternative a direct writing method was analyzed. It consists in the ablation of the coatings with different laser sources. Depending on the choice of the laser wavelength and pulse length, a strong change in the emitter profile was observed. These changes have a strong effect in the subsequent metallization process. The application of more sophisticated concepts like LCP was also presented. The strategy applied in this thesis is to evaluate industrial-oriented technologies, starting from concepts which already allow a high-efficiency performance. The developments presented in this chapter enable the substitution of expensive steps for the patterning of dielectrics with industry-relevant processes, mainly inkjet printing and laser ablation. Most of the technologies presented here are contact-less, and therefore compatible with the processing of

very thin substrates. In addition, they allow fine line formation. They can also be implemented for the formation of structures on the rearside in alternative cell concepts.

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