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Properties of Inkjet and Screen Printed Circuits with Substrate Treatments

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Recently, circuit printing technology has been considered as a promising alternative to conventional PCB fabrication, for it can greatly reduce the manufacturing costs. Even though printed circuit has many advantages over typical subtractive technology such as fewer processes, it has some disadvantages. The major problems are low adhesion and poor resolution. Efforts to overcome these problems have been mainly focused on ink developments with a limited success. And surface treatments showed some improvements. Therefore, various plasma treatments and primer coatings on plastic substrates have been tested. Plasma treatments using hydrocarbon gases including methane and propane improved the pattern quality of the inkjet printed circuit, which are further improved upon heating of substrate. On the other hand, there is little effect on the adhesion, which is improved only by a special primer coating. The adhesion of inkjet printed circuit has been increased more than 10 times upon treatment. As for the screen printed circuits, the overall effects are less significant since there is some organic binder in the ink. Nonetheless, the treatment has strong positive effects on pattern quality and adhesion. The adhesion of 1 kgf/cm2, which is comparable with those of the conventional PCB circuits, is possible through primer coating for both screen and inkjet printed circuits. The resulting circuit also showed good thermal, mechanical and electrical properties.

Keywords: Printed electronics, Inkjet printing, Screen printing, Surface treatment, Primer coating, Adhesion promotion

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고분자, 탄소나노튜브, 그래핀의 분자조립을 이용한 저비용, 대면적 나노제작기술

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본 발표에서는 고분자나 탄소나노튜브, 그래핀 등 탄소소재의 분자배열을 다양한 형태로 조절할 수있는 분자조립 공정을 통해 비교적 저비용으로 대면적에서 나노구조체를 제작할 수 있는 다양한 기술들을 소개할 것이다. 특히 블록공중합체의 분자조립현상을 기존에 반도체나 디스플레이에 쓰이고 있는 ArF 리소그라피나 I-line 리소그라피와 융합하여 대면적에서 분자조립 나노패턴을 제작할 수 있는 기술들을 소개할 것이다. 또한 탄소나노튜브와 그래핀등 탄소소재를 용액공정이나 촉매나노패턴공정을 통해 3차원적인 다양한 형태로 조직화하는 신기술들도 소개할 것이다.

Keywords: 연성소재, 분자조립, 나노공정