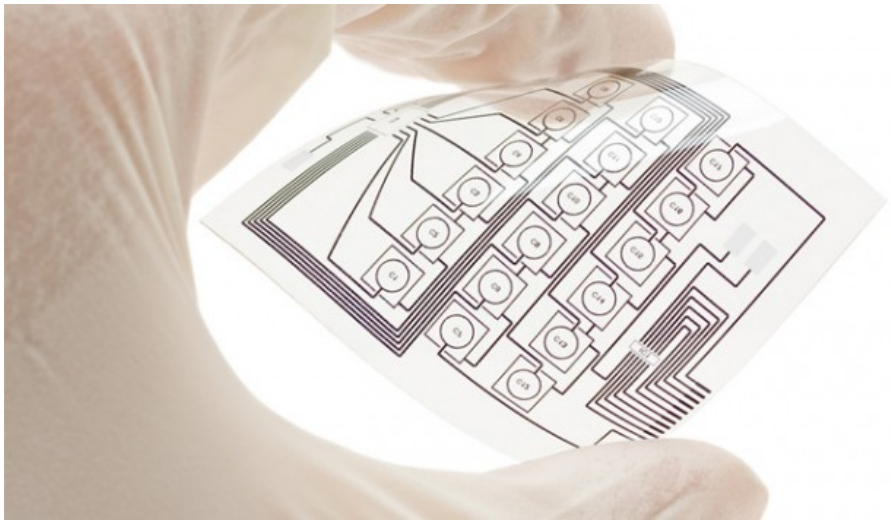
Printed Wireless Power Chips - May Be The Kick Start NFC Needs

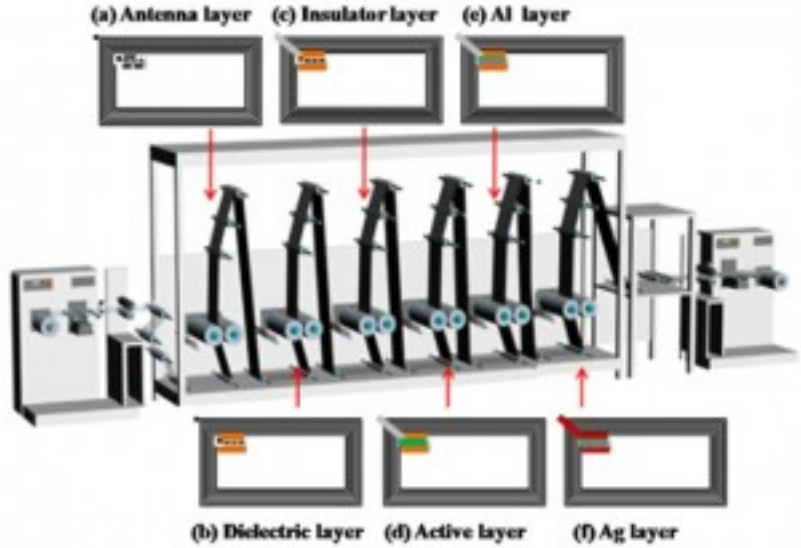


If you follow the mobile computing scene, you're probably well aware that NFC — near field communication [1] — is meant to be the next big thing. In fact, NFC and its sister RFID have been the next big thing for years — but for some reason, they've just never taken off. A group of Korean scientists think they've finally cracked it, though: The lack of adoption is all down to *price*, and to rectify that they've discovered a way of producing really cheap RFID tags using a roll-to-roll printer.

[2]In the last year, huge strides have been made towards printed computer chips. These chips are flexible, much cheaper to produce than their carved-from-a-silicon-wafer cousins, and one of the most

important steps towards ubiquitous, wearable computing. The main difficulty of producing these printed devices is turning materials — such as silver, gold, and aluminium — into inks that can be printed (and dried/cured) using existing infrastructure.

In a conventional RFID tag (right), there is a standard integrated circuit (lithographically produced), which is connected to a rectifier (also lithographic), which is connected to an antenna (simply etched out of copper). When the tag is brought near a reader (such as the NFC chip in your phone), the antenna receives AC power via inductive coupling, the rectifier converts the AC power into DC, and the integrated circuit comes to life, sending and receiving data with the NFC chip.



[3]According to the Korean scientists, integrating the rectifier and antenna (to create a “rectenna”) is costly, complicated work, which has held back the proliferation of RFID tags and sensor networks — which is why they’ve created an integrated *printed rectenna* that can be produced all in one go, using the same kind of roll-to-roll printer that would be used to print a newspaper (see right). The printing speed is around 8 meters per minute — which equates to a few hundred rectennas per minute. The total cost per single rectenna is just one cent.

The ultimate goal, of course, is to produce RFID tags that are so cheap (and flexible) that they can be embedded in everything, from signs and posters in shop windows, through to the price tags on clothes and groceries. While QR tags are filling this role at the moment, they struggle to hold more than a few dozen bytes of data — while an RFID tag can comfortably store a few kilobytes. Instead of scanning a QR code that redirects you to a website, an RFID tag could contain a product’s calorie content, the provenance of its ingredients, the name of the burger flipper, and so on.

To realize the dream of a smart city — an Internet of Things [4] — cheap RFID tags are key.

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