

# **Barrier-metal-free (BMF), Cu Dual-damascene Interconnects with Cu-epi-contacts buried in Anti-diffusive, Low-k Organic film**

M. Tada, H. Ohtake, Y. Harada, M. Hiroi, S. Saito, T. Onodera, N. Furutake, J. Kawahara,  
M. Tagami, K. Kinoshita, T. Fukai, T. Mogami and Y. Hayashi  
System Devices and Fundamental Research, NEC Corporation  
1120, Shimokuzawa, Sagamihara, KANAGAWA 229-1198, Japan.

## **Abstract**

Barrier-metal-free (BMF), Cu dual-damascene interconnects (DDI) are fabricated in the plasma-polymerized, divinyl siloxane bis-benzocyclobutene (p-BCB:  $k=2.6$ ) polymer film, which is featured by the anti-diffusive characteristics for the Cu. The BMF-structure has inter-line leak current as low as that of a conventional barrier-inserted structure and is estimated to keep the high insulating property over 10 years under 1MV/cm. The BMF-structure also derives Cu-epi-contacts, reducing the via-resistance of 50% to the conventional Cu/barrier/Cu contacts.