

# Contact Properties of Micromachined Ni Probes

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*Abstract*-The authors have investigated aluminum-contact properties of two types of micro-machined nickel probes designed for low-contact force and high density probe cards. The one probe is the micro-machined Ni curl-up cantilever, which was realized utilizing electroplating deposition of two layers having different internal stress, and has the low force constant of 0.1-0.3 N/m. The other is the Ni micro-cantilever designed to make contact to pad electrodes by buckling at the load of about 5 mN. This buckling contact has the advantage that the contact forces of all the probes could be almost uniform. For the two types of probes, although low contact resistance could not be obtained by only mechanical press, the contact resistance around  $1 \Omega$  was obtained using the fritting process in which a voltage is applied between a pair of probes. For the case of the curl-up micro-cantilevers, the force required to make low resistance contact was smaller than  $10 \mu\text{N}$ . The fritting current larger than 200 mA makes it possible to decrease the contact resistance to around  $1\Omega$  for both the types of micro-machined probes.

*Keywords*; micro-machined probe card, fritting contact