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Hydrolytic stability of novel silane coupling agents with phenyl group

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Novel silane coupling agents containing hydrophobic phenyl group 3-(3-methoxy-4-methacryloyloxyphenyl) propyl-trimethoxysilane(*p*-MPS), -triisocyanatesilane (*p*-MBI), -trichlorosilane (*p*-MBC) were synthesized. The bonding durability of these silanes against water immersion and thermal stress was investigated.

3-methacryloyloxypropyltrimethoxysilane (3-MPS) was used as a control. The glass plates modified with those silanes at a concentration of 2wt% were kept for 3 minutes at 120℃, and then were bonded to the heaped metal with self-cured resin composite. The specimens were stored in distilled water until 360 days or thermally stressed. Tensile bond strength was measured on the five specimens. The collected data were analyzed statistically using ANOVA and Fisher PLSD. The glass plates modified with 3-MPS showed significant decrease of tensile bond strength after 10,000 cycles of thermal stress (16MPa→10MPa, $p<0.05$). The strengths of the *p*-MPS, *p*-MBI and *p*-MBC showed significantly high compared with that of 3-MPS after the thermal stress ($p<0.05$). Especially, the strengths of the *p*-MBI (26MPa) and *p*-MBC (17MPa) specimen showed no significant change after water immersion or thermal cycle. It was found that those silanes with p-directing and hydrophobic organo functional group showed excellent resistance against water immersion and thermal stress compared with 3-MPS.

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