

IMPROVING ADHERENCE BETWEEN GLASS TILES AND CEMENT MORTAR BY ORGANOSILANES

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Adherence between glass tiles and cement mortars are crucial to the stability of tile systems and based on chemical features, only the weak van der Waals forces and hydrophilic interactions may be expected to develop between glass tiles and Portland cement mortar. By the other side, surface modification is generally performed to create or modify certain surface properties and silane coupling agents are the standard products used to alter surface features. Besides that, it has been studied the possibility of development of covalent bonds between some organosilanes and cement through covalent bonds. In this sense, the object of this paper was to use organosilanes as primers to modify glass tile surface properties in order to improve adhesion between glass tiles and cement mortars.

Glass tile surface has been treated with several silane derivatives bearing specific functionalities. Amino and vinyl groups were chosen as reactive groups of silanes for evaluating their interaction to cement mortar. Contact angle measurements and Fourier Transformed Infrared Spectroscopy were used as characterization techniques for evaluating interaction at glass tile/cement mortar interface. In order to assess the effect on adhesion properties, unmodified and modified glass tiles unmodified and modified were installed onto a cement based substrate using cement mortars and pull of tests were conducted.

Contact angle results have given reliable evidence that they were altered from hydrophilic to hydrophobic after silane modification. FTIR spectra presented major peaks associated with the organic moieties. Pull-off test results have indicated that surface modification has affected bond strength between cement mortar and glass tile. Aminosilane has improved adherence of mortar, changing the mode of rupture from interfacial to a mixed mode interfacial-cohesive at mortar. Vinylsilane modifier has presented a contrary effect, reducing adhesion at interface. This increasing of strength is related to the possibility of hydrophilic and covalent bonds, beside the weak van der Waals forces, between cement mortar and glass tile modified surface.

In this work we have shown through contact angle and FTIR measurements that the proposed method of silane application and reaction was efficient to functionalize glass tile surface. Also, the effects of surface modification on bond strength between Portland cement mortar and glass tile were verified. The adherence results varied in a broad range reflecting the overall balance of silane and cement features including reactive organofunctional group, hydrophobic/hydrophilic features, kind of interactions developed between silane and cement.