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PIEZOELECTRIC/ELECTROSTRICTIVE ACTUATOR HAVING CERAMIC
SUBSTRATE WITH AUXILIARY WINDOWS IN ADDITION TO PRESSURE
CHAMBER WINDOWS

ABSTRACT

A piezoelectric/electrostrictive actuator including a ceramic substrate (64) and piezoelectric/electrostrictive elements (70) is disclosed. The ceramic substrate includes: a spacer plate (62) having a plurality of windows (68) formed in a row in the longitudinal direction of the spacer plate, and auxiliary windows (78) formed adjacent to respective two outermost windows (68) which are located at the opposite ends of the row of the plurality of windows, such that the auxiliary windows sandwich the row of the plurality of windows; and a closure plate (56) superposed on one of opposite major surfaces of the spacer plate, so that the plurality of windows and the auxiliary windows of the spacer plate are closed by the closure plate to provide pressure chambers (36) and enclosed spaces, respectively, within the substrate. The spacer plate and the closure plate are formed from respective ceramic green sheets which are laminated on each other and fired into an integral structure as the ceramic substrate. The piezoelectric/electrostrictive elements (70) are disposed on respective portions of the closure plate (56) which partially define the pressure chambers (36), respectively, but are not disposed on respective portions of the closure plate (56) which

partially define the enclosed spaces corresponding to the auxiliary windows (78).

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