Abstract: We consider planar elasticity interface problems whose solution domains are made of multiple elasticity materials separated by well-defined interfaces. Numerous methods, in either finite difference and finite element formulations, have been developed for solving elasticity problems efficiently and accurately. However, conventional finite element methods have to use meshes constructed according to the materials interfaces; otherwise, their convergence cannot be guaranteed. This talk presents immersed finite element (IFE) methods for solving planar elasticity interface problems with interface-independent structured Cartesian meshes. Basic features of linear and bilinear IFE functions, including the unisolvence property, will be discussed. While both methods have comparable accuracy, the bilinear IFE method requires less time for assembling its algebraic system. Our analysis also indicates that the bilinear IFE functions are guaranteed to be applicable to a larger class of elasticity interface problems than linear IFE functions. Numerical examples are provided to demonstrate that both linear and bilinear IFE spaces have the optimal approximation capability, and that numerical solutions produced by a Galerkin method with these IFE functions for elasticity interface problems also converge optimally in both L2 and semi-H1 norms. We will conclude by discussing limitations of these IFE methods and feature research directions.