Abstract: A method is provided to allow characterization of rock or other types of samples, such as plugs extracted for core analysis, using a sliver or sample mount that is prepared to have a sample and optionally a plurality of thin discrete reference objects encapsulated by hardened encapsulant, such as castable mounting materials, that surrounds the peripheral edges of the sample and any reference objects. Systems for performing the methods are also provided. An X-ray scannable sliver also is provided as a single unit that has a thin discrete sample and a plurality of thin discrete reference objects encapsulated by hardened encapsulant that encases the peripheral edges of the sample and reference objects. The sample mount can be subsequently analysed by X-ray computerised tomography, scanning electron microscopy (SEM) and combined SEM and focused ion beam (FIB).