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Wellbores provide access beneath the ground for a multitude of operations, including fluid storage, waste disposal, and oil/gas exploration. Wellbores typically consist of a steel casing surrounded by cement to create a seal between the host formation and casing. Because wellbores often leak through cement fractures, pressurized fluids (gas or liquid) can leak upward and cause contamination of overlying water-bearing zones and/or cause safety issues at the surface (e.g., explosions). Current state-of-the-practice technologies for repairing wellbores are very expensive and are not always successful, especially in small but leaky fractures. We have developed a technique that effectively and inexpensively seals fractures by injecting a fluid into the wellbore that mainly contains asphaltene and resin, large organic molecules available in crude oil. Flow paths are plugged as these molecules aggregate into large structures referred to as micelles. These micelles form a gunky semi-solid that is deposited along the fracture surface and effectively seals the fracture. We encourage the formation of micelle formation and deposition by applying a small potential difference across the wellbore system (electrokinesis). This affordable technique will also ensure that flowable fluids will return to the storage cavern instead of leaking out to the environment, during the repair work.