Supplement materials:

Clay Nanotubes for Corrosion Inhibitor Encapsulation: Release Control with End Stoppers

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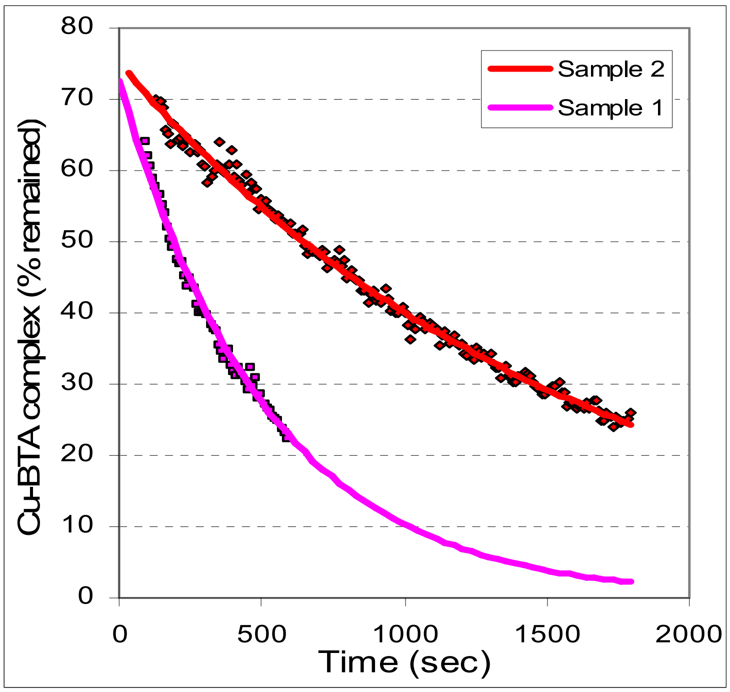

Fig.1. Decomposition kinetics of Cu-BTA complex by ammonia solution: sample #1 and sample #2 (with 0.5 % iron).

Cu-BTA decomposition kinetics was different for halloysite samples #1 and #2 (Fig.1). The decomposition process follows a pseudo - first order reaction kinetics in the presence of excessive amounts of ammonia which is described by the following formula; $W_t/W_0 = e^{-kt}$, where W_t is the amount of Cu – BTA complex remaining at time t, W_0 is the initial amount of the complex, and k is the first order reaction rate constant. Constants of the reaction were $1.95 \cdot 10^{-3}$ and $6.28 \cdot 10^{-4}$ for the samples #1 and #2 respectively. This is a clear indication that the complex film interacts stronger with iron rich sample # 2. Fig. 10 also indicates that about 25 % of the complex decomposed immediately after the exposure to ammonia solution.

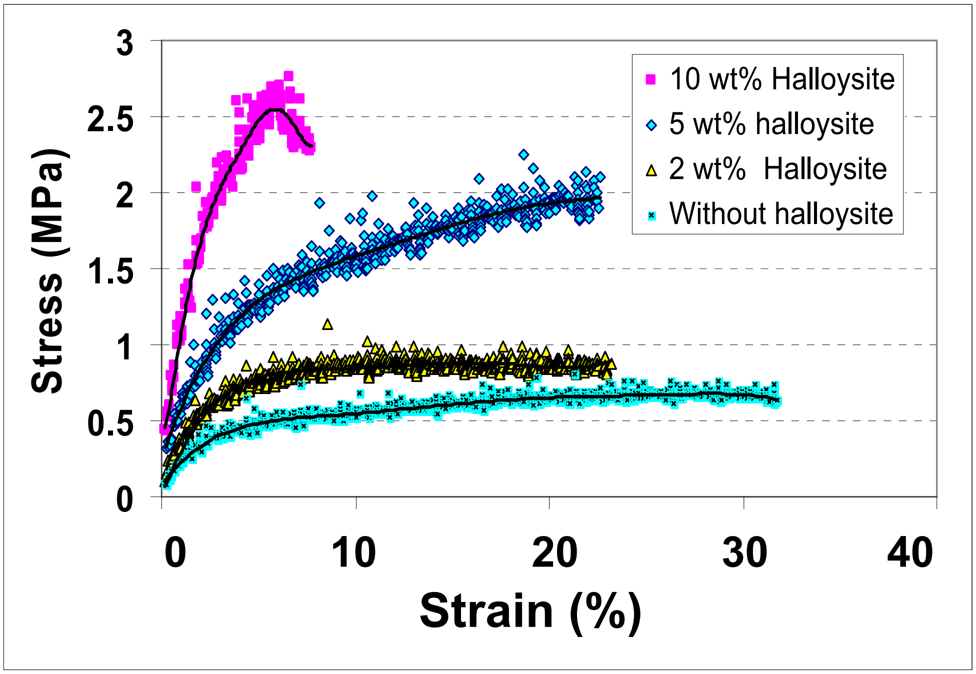

Fig.2. Stress-strain relationship of industrial oil based blue paint.

Addition of nanotubes into industrial oil based paint significantly improved the strain – stress characteristics of the coating as it is demonstrated in Fig 4. Threefold increase of paint tensile strength was observed with addition of 5 wt % of halloysite (0.7 MPa for pure paint versus 1.9 MPa for 5 wt % halloysite loaded paint). Halloysite filler also increases a hardness of the paint. An elastic modulus of the dry paint samples was 16.3 MPa for the layer of pure paint were 23.1, 34.6, 69.3 MPa for 2 wt %, 5 wt %, and 10 wt % composite of halloysite with paint, respectively. However, paint films became brittle for more than 5 wt % halloysite loading.