Effect Of Additives On Copper Electroplating: Vibrational Spectroscopic And AFM Measurements

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We used vibrational spectroscopic measurements in conjunction with detailed calculations to understand the basis for the inhibition and acceleration effects evinced by two common electroplating additives: polyethelyene glycol (PEG) and bis-(sodium sulfoproply)-disulfide (SPS), respectively. Both of these additives form complexes with Cu(I) and Cl- also present in the plating bath. In the case of PEG, this Cu(I)-Cl species acts as an inhibitor, because of the relative stability of Cu(I)-O bonds. In the case of SPS, the Cu(I)-Cl complex is relatively easy to reduce, because of the charge delocalization afforded by the bis-thiol species. Extension of this insight to the superfilling process itself will be discussed.