This paper presents two new greedy sensor placement algorithms, named minimum nonzero eigenvalue pursuit (MNEP) and maximal projection on minimum eigenspace (MPME), for linear inverse problems, with greater emphasis on the MPME algorithm for performance comparison with existing approaches. In both MNEP and MPME, we select the sensing locations one-by-one. In this way, the least number of required sensor nodes can be determined by checking whether the estimation accuracy is satisfied after each sensing location is determined. For the MPME algorithm, the minimum eigenspace is defined as the eigenspace associated with the minimum eigenvalue of the dual observation matrix. For each sensing location, the projection of its observation vector onto the minimum eigenspace is shown to be monotonically decreasing w.r.t. the worst case error variance (WCEV) of the estimated parameters. We select the sensing location whose observation vector has the maximum projection onto the minimum eigenspace of the current dual observation matrix. The proposed MPME is shown to be one of the most computationally efficient algorithms. Our Monte-Carlo simulations showed that MPME outperforms the convex relaxation method, the SparSenSe method, and the FrameSense method in terms of WCEV and the mean square error (MSE) of the estimated parameters, especially when the number of available sensor nodes is very limited.