

# Spontaneous formation of fractal aggregates of Au nanoparticles in epoxy-siloxane films and their application as substrates for NIR Surface Enhanced Raman Spectroscopy

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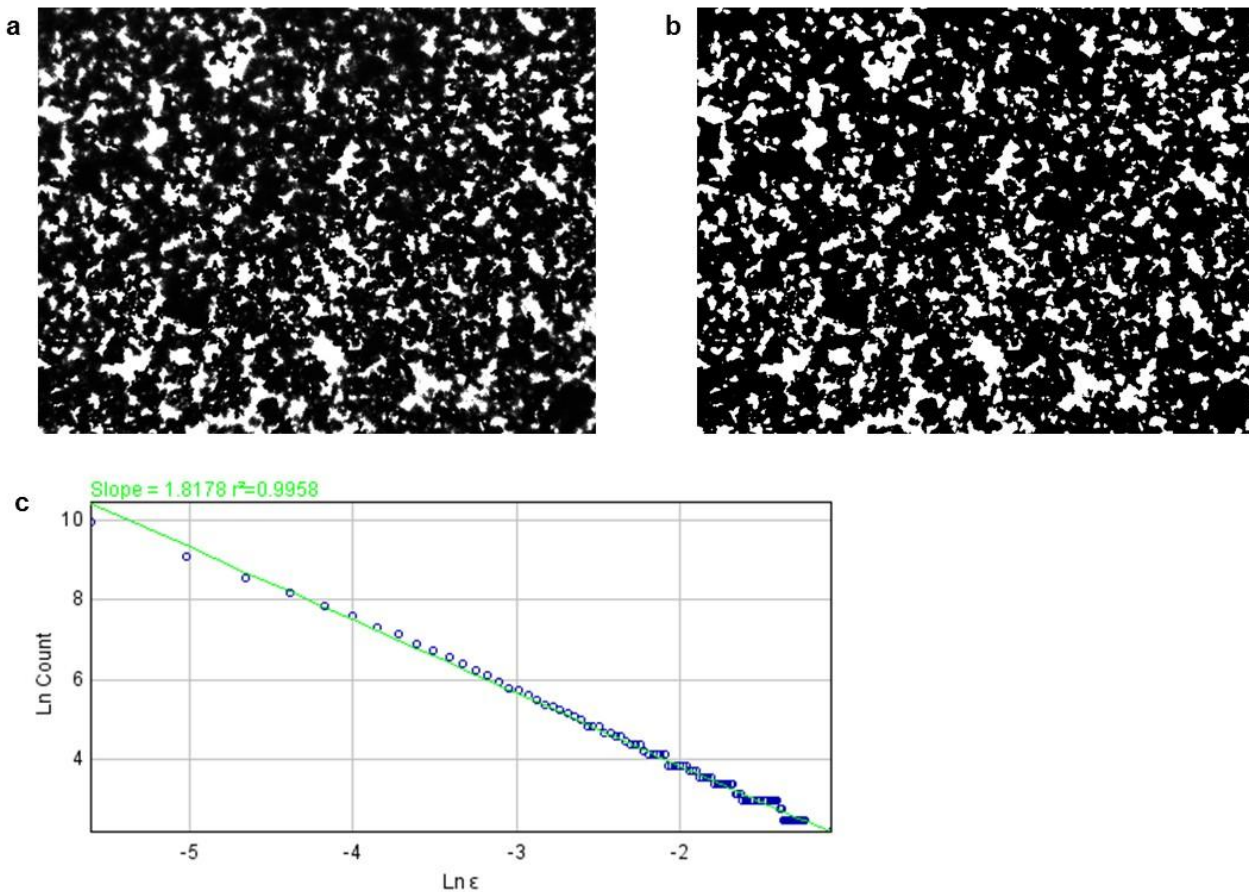
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## Measurement of fractal dimension D

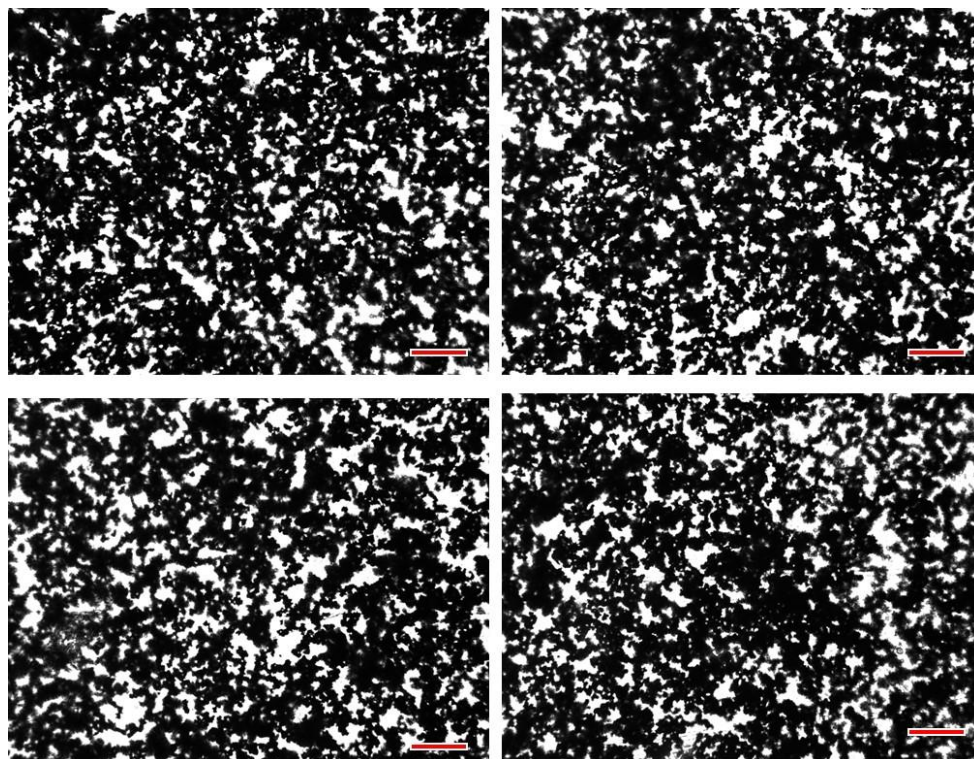
D was determined through the box counting method.<sup>51</sup> In this method, D is measured by placing several grids of decreasing box size and by counting the number of boxes containing the fractal structure. The slope of the log-log plot of number of boxes containing the parts of fractal structure (n, count) *versus* size of the box ( $\epsilon$ ), gives the fractal dimension D.

$$D = \log n / \log \epsilon \quad \lim \epsilon \rightarrow 0$$

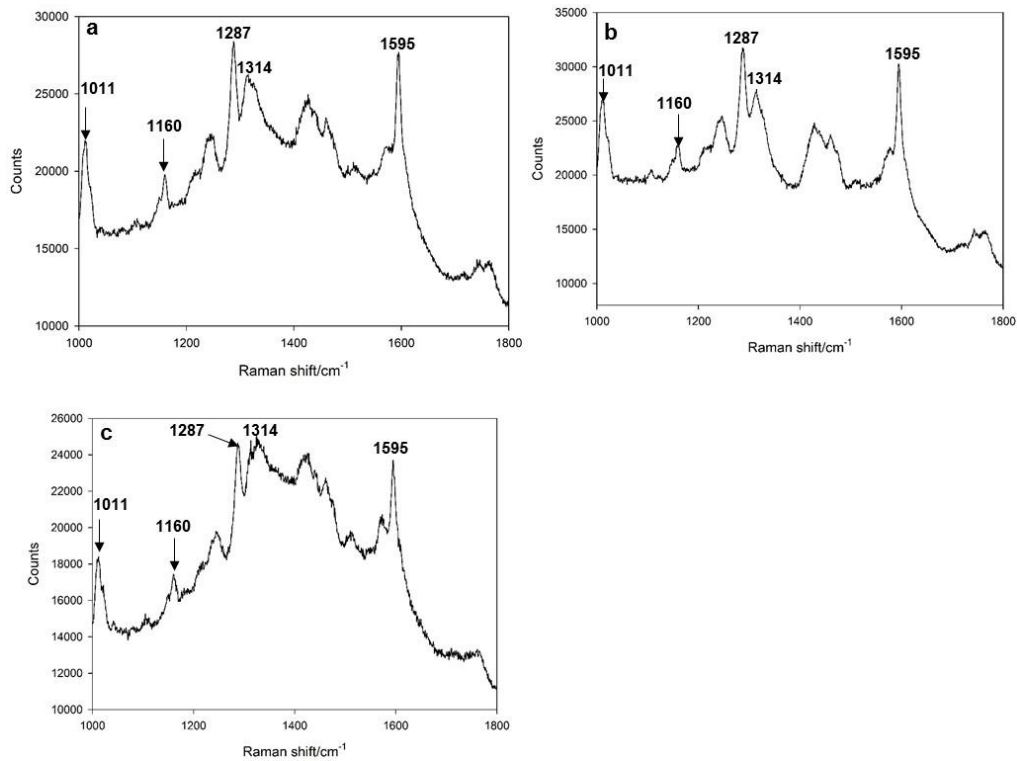
Measurements were carried out on binary images of optical micrographs. A sample procedure is shown in Figure S3; first, the optical micrograph (Figure S3(a)) is binarized (Figure S3(b)) before applying the box counting method (using ImageJ plugin fraclac). A log-log plot of n versus  $\epsilon$  is then generated (Figure S3c), the slope of which yields the fractal dimension.



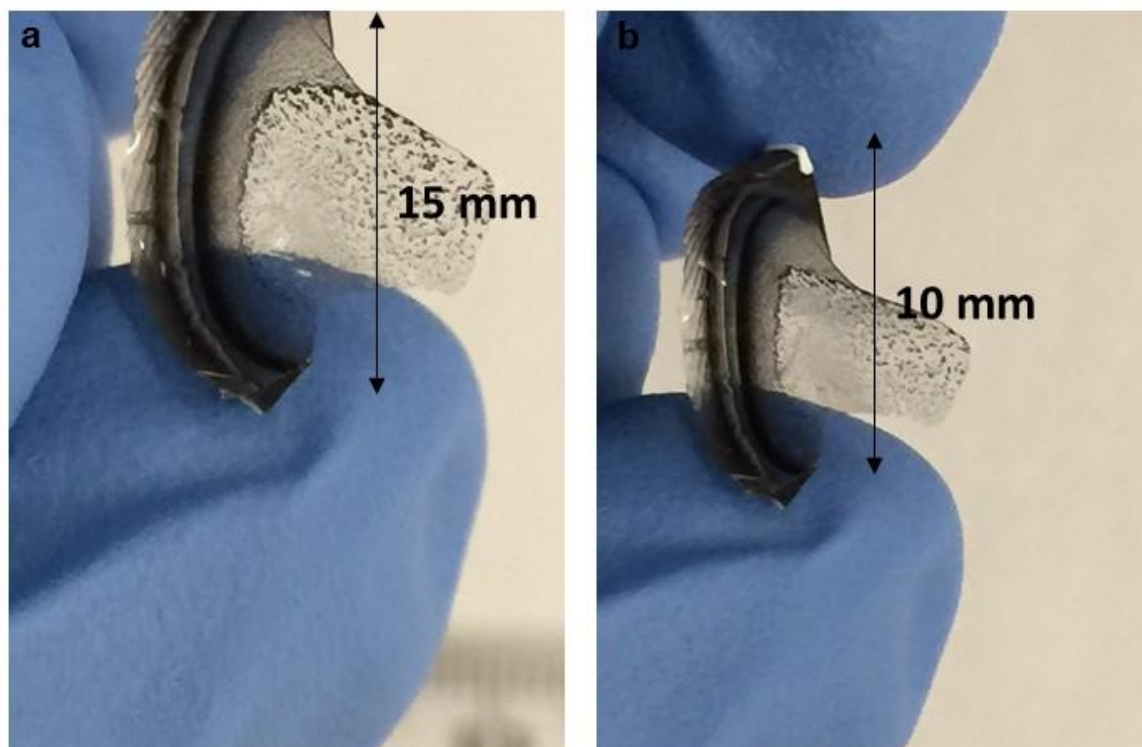
**Figure S1.** Determination of fractal dimension using box counting method (a) optical micrograph of thin film embedded with Au nanoparticles fractal aggregates (b) corresponding binary image (c) log-log plot of  $n$  vs  $\epsilon$ , with the slope giving the fractal dimension



**Figure S2.** Examples of optical micrographs of epoxide films containing aggregates of Au nanoparticles employed to determine the fractal dimension of aggregates (scale bar = 50  $\mu\text{m}$ )



**Figure S3.** SERS spectra of 1 mM solution of Eosin Y reproduced on 3 different samples of epoxide films containing fractal aggregates of Au nanoparticles. All films were prepared under identical conditions and all spectra were acquired with the same parameters.



**Figure S4.** Photographs of free-standing epoxide film containing aggregates of Au nanoparticles in (a) normal and (b) flexed position.

## Reference

- S1. A. Hecht, P. Commiskey, F. Lazaridis, P. Argyrakis and R. Kopelman, *ChemPhysChem*, **2014**, 15, 3444–3446.