Experimental evidence for a spinodal region in the phase diagram of calcium carbonate

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Lately, liquid phase separation has been proposed as a potential mechanism for the formation of amorphous calcium carbonate (ACC) from solution. To enable a mechanistic study of this process, in our experiments we investigated the formation of ACC at a wide range of preparation conditions. The procedure generated ACC particles which were chemically and structurally identical, but varied in particle size. Using the theory of spinodal decomposition, we analyzed the size of these ACC particles as a function of temperature and concentration of the calcium carbonate solution. By doing so, we obtained strong experimental evidence that ACC forms by spinodal decomposition. At the same time we determined the position of the spinodal region in the phase diagram of calcium carbonate.