illustrating that the present unit cell volume of the A-type is probably the smallest unit cell volume possible for this structure type, whereas that of the U_2S_3 phase, is one of the largest of its type. However, the U_2S_3 phase is probably more compressible at higher pressures. These factors indicate that for the present compound $GdYbS_3$, we have a critical relationship between the sizes of the Gd and Yb which makes it possible to obtain both structure types for the same compound. The average radius of the cations Gd and Yb is 0.898 Å, which lies between the cationic radii of Ho and Y[4]. Preliminary experimental results on the compounds Ho_2S_3 and Y_2S_3 at low pressures and high temperatures indicate that the A-type structure may also occur for these compounds.

One of us (CLARK) would like to thank the Alexander von Humboldt Foundation for a fellowship, which made this investigation possible. The Fonds der Chemischen Industrie supported our research. Calculations were carried out on the TR 440 of the Leibniz Computing Center of the Bavarian Academy of Sciences.

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