Supplementary Information

Solvent-mediated probe ultrasonication (SM-PUS) approach for effective synthesis of metal/metal oxide nanosheets at ambient conditions

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Visible Observation of the fluorescence

Fig. S1. Visible observation of the fluorescence of the synthesized 2D Ni nanosheets under UV light.

The intrinsic fluorescence produced by the as-synthesized Ni nanosheets was observed in bluish-green color, as shown in **Fig. S1**.

Fluorescence intensity comparison for as-synthesized 2D Ni nanosheets in different solvents

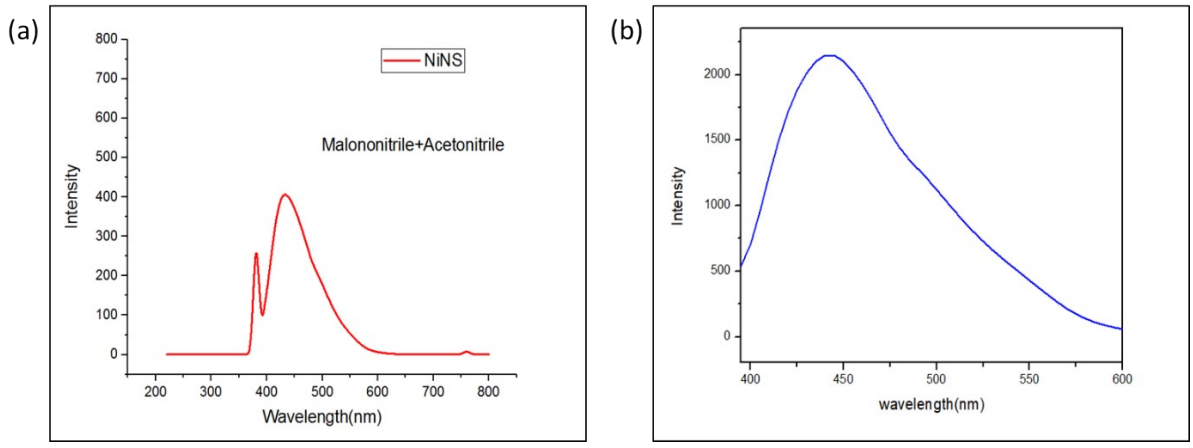

Fig. S2. Fluorescence intensity comparison for as-synthesized 2D Ni nanosheets in different solvents. (a) Ni nanosheets in Malononitrile dissolved in Acetonitrile. (b) Ni nanosheets in Malononitrile dissolved in DI water.

As depicted in **Fig. S2**, the fluorescence intensity for Malononitrile in Acetonitrile (CAN) is far less than for Malononitrile in water. The reason behind this is not fully clear yet and can be clearly understood in an extension of the study at a later stage. The currents peculation may be due to the interference of the nitrile group in acetonitrile and the polarity difference between water and acetonitrile could be the reason for this occurrence.

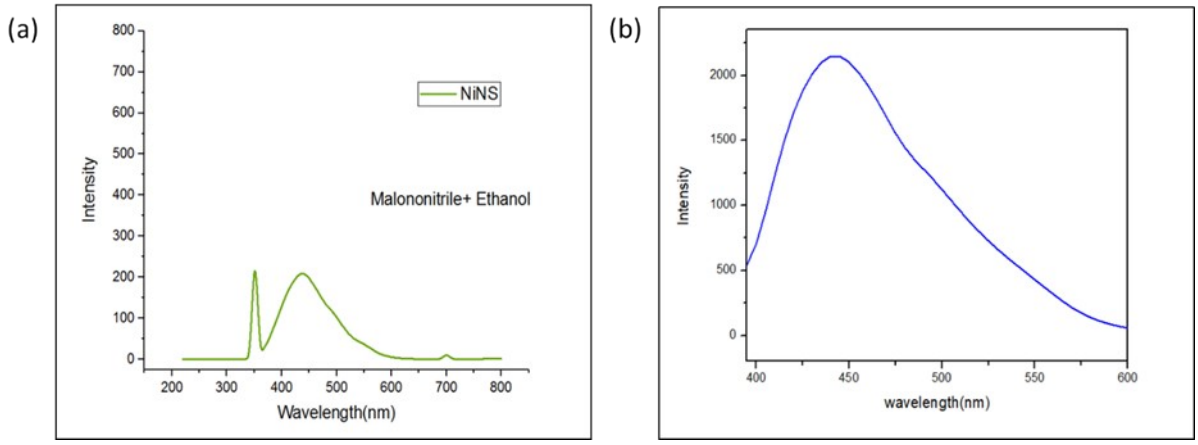

Fig. S3. Fluorescence intensity comparison for as-synthesized 2D Ni nanosheets in different solvents. (a) Ni nanosheets in Malononitrile dissolved in Ethanol. (b) Ni nanosheets in Malononitrile dissolved in DI water.

Here in **Fig. S3,** comparatively very little fluorescence intensity was observed for malononitrile in ethanol. The reason could be the polarity change, but there is confusion coming with acetonitrile. Acetonitrile is much less polar than ethanol, but acetonitrile showed higher fluorescence intensity. When considering both ethanol and acetonitrile, these have only one positive polar end and also a negative end. But malononitrile has two negative poles, and in the water, there are two positive poles. This makes it much more compatible with this feature. Therefore, this fluorescent intensity decrement might happen due to the combined effect of polarity, number of polar ends, and functional groups.

UV-visible absorption comparison for as-synthesized 2D Ni nanosheets in different solvents

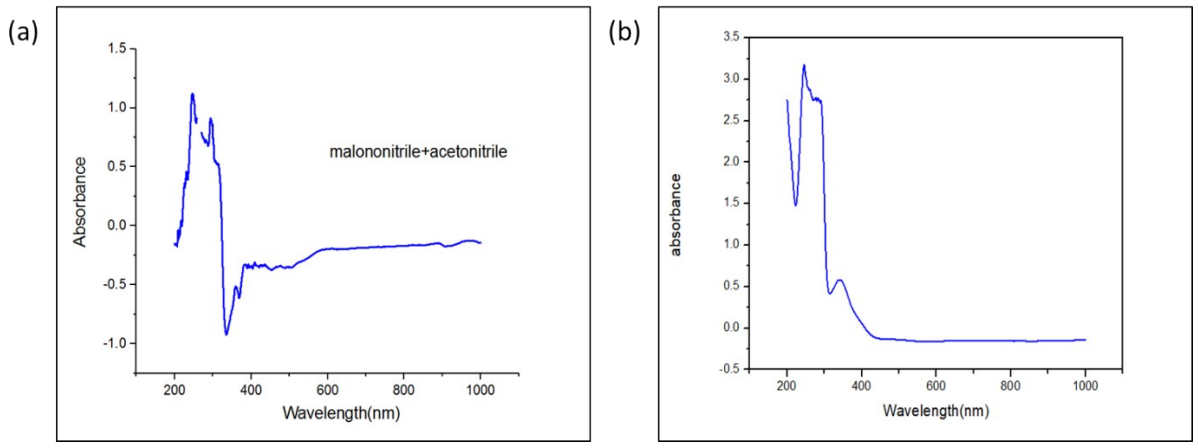

Fig. S4. UV-Visible absorbance comparison for as-synthesized 2D Ni nanosheets in different solvents. (a) Ni nanosheets in Malononitrile dissolved in Acetonitrile. (b) Ni nanosheets in Malononitrile dissolved in DI water.

Obtained UV-visible absorbance spectra for malononitrile in acetonitrile were also very unusual, with negative values as shown in **Fig. S4.** The reason might be the significant alteration of acetonitrile properties by malononitrile to have negative values from the solvent blank. On the other hand, the UV-visible absorption spectrum was much firmer for the sample with malononitrile in DI water.

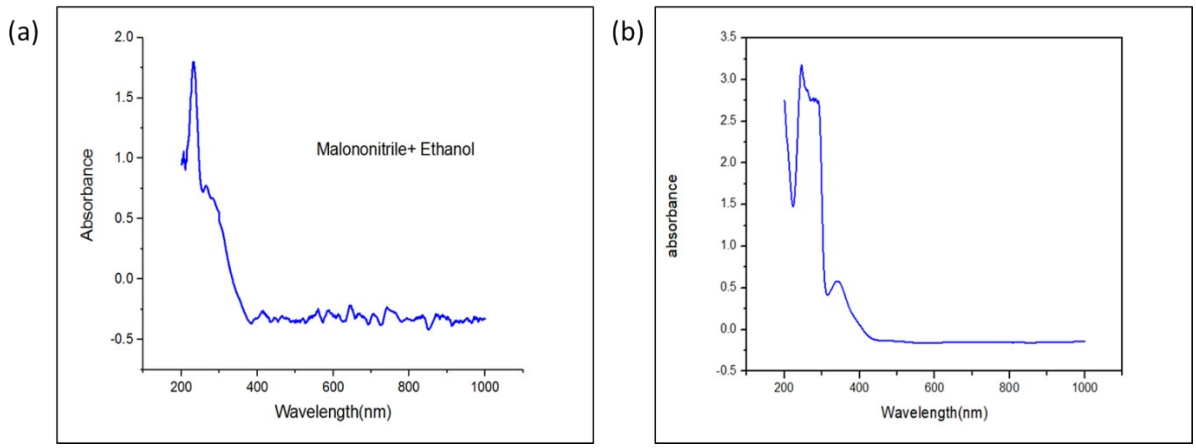

Fig. S5. UV-Visible absorbance comparison for as-synthesized 2D Ni nanosheets in different solvents. (a) Ni nanosheets in Malononitrile dissolved in Ethanol. (b) Ni nanosheets in Malononitrile dissolved in DI water.

The observation was kind of similar to acetonitrile in the case of ethanol, but not that much variation compared to the water system, as shown in **Fig. S5.** UV-Visible absorption spectra. This may be mainly due to the nitrile group replacement with hydroxyl in ethanol.

However, any crystal-clear clarification cannot be given since the available data is not enough in this preliminary study.